ENERGY STAR® Audio Video (A/V)

Version 4.0 Draft 1 specification

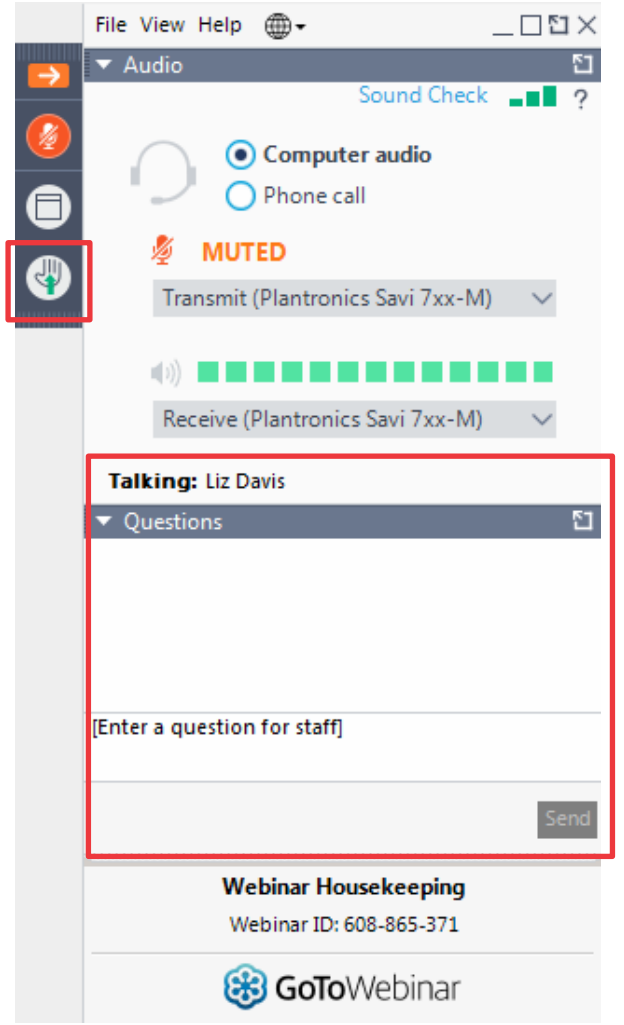
Webinar

November 15, 2022

Webinar Participation

- Please mute yourself when you are not speaking (use local mute or dial *6)
- Feel free to ask questions at any time

Submit written comments to audiovideo@energystar.gov by **December 9, 2022**



Agenda

1. **Introductions**
2. Overview
3. Test Method & Applicability to Specification
4. Definitions
5. Scope
6. Challenges
7. General Certification Criteria
8. Standby Mode Requirements
9. Active Mode Requirements
10. Next Steps

Introductions

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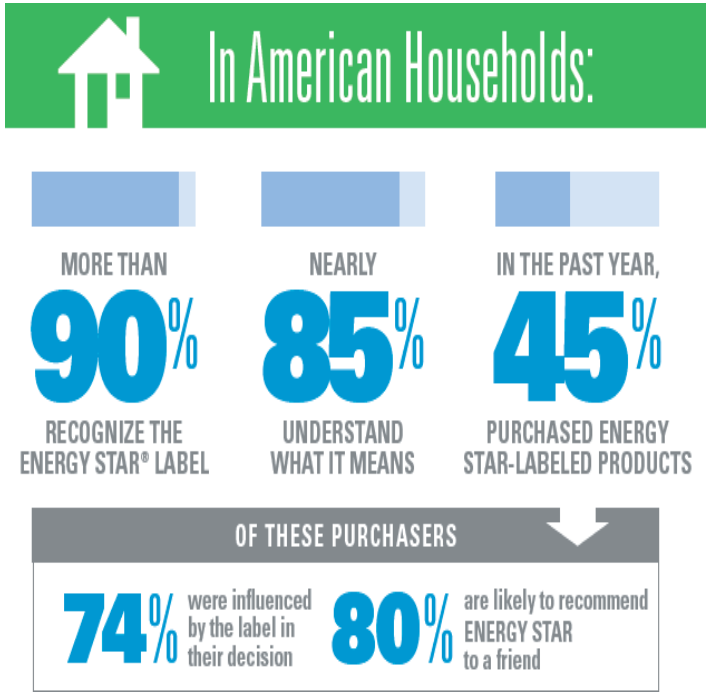
What is ENERGY STAR?

The simple choice for energy efficiency.

EPA's ENERGY STAR identifies the most energy-efficient **products, buildings, plants**, and **new homes** – all based on the latest government-backed standards.

Today, every ENERGY STAR label is verified by a rigorous third-party certification process.

Benefits to joining ENERGY STAR



- Access a network of over 700 utilities
- Leverage the label recognition
- Access customer support teams at EPA
- Use co-brandable materials
- Participate in promotional events
- Get listed on publicly-available ENERGY STAR search tools
- Apply for the ENERGY STAR Partner of the Year Award
- Receive email notifications about program activities

ENERGY STAR PartnershipTypes

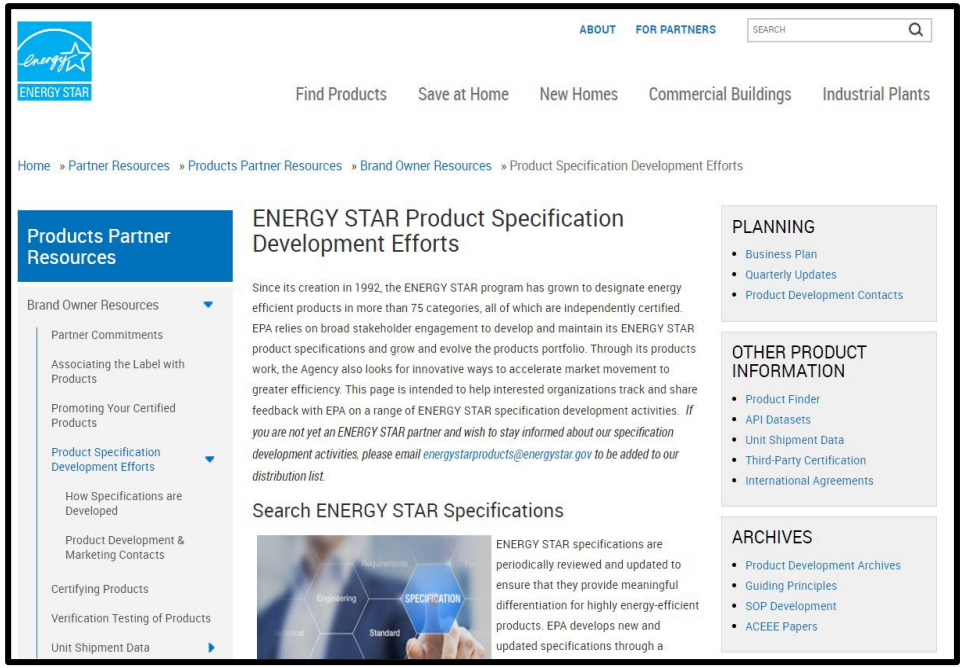
The simple choice for energy efficiency.

- Brand owner
- Retailer
- Residential building
- Commercial building, service, product, or association
- Industrial plant, service, product, or association
- Energy Efficiency ProgramSponsor

For more information on joining as an ENERGY STAR partner visit this webpage https://www.energystar.gov/partner_resources/join-energy-star

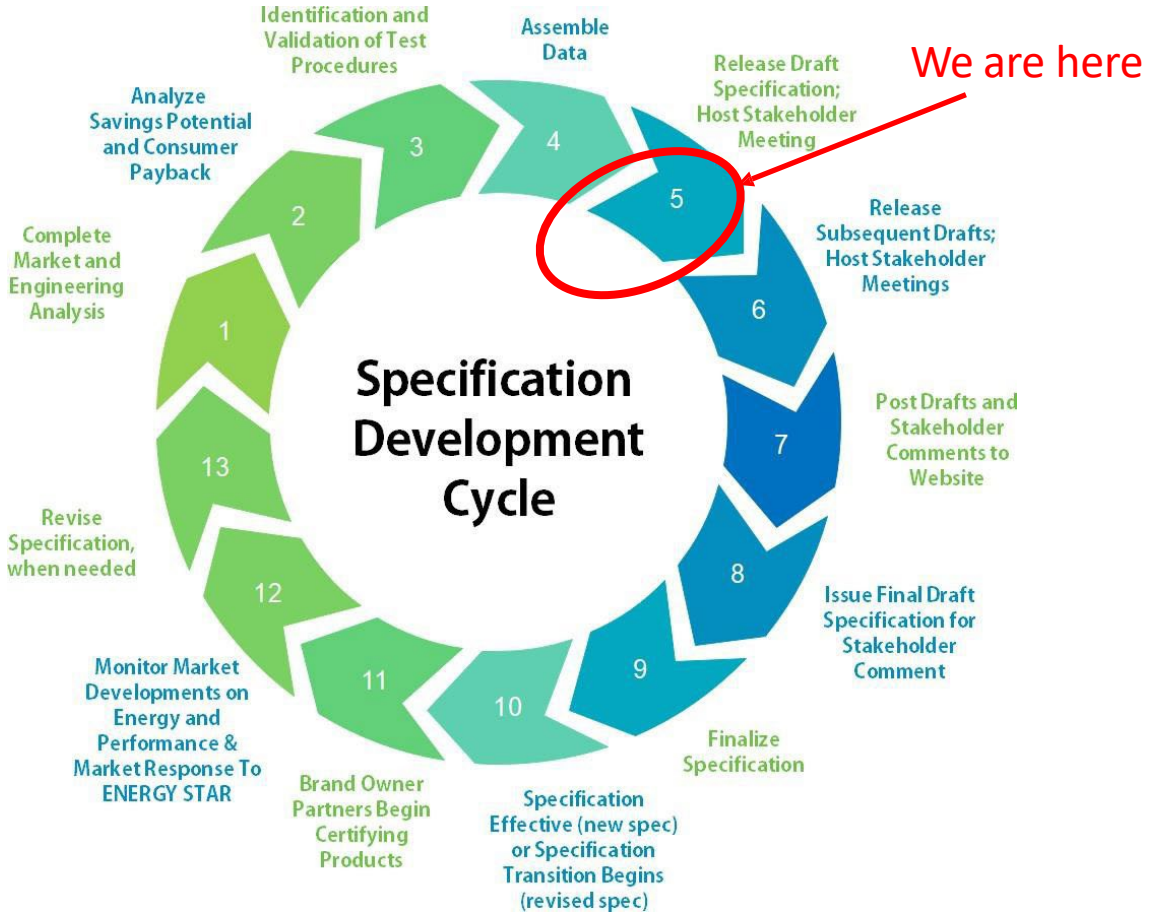
Specification Development

- ENERGY STAR follows EPA's Standard Operating Procedure through the specification development and revisions process, balancing:
  - The need to keep pace with evolution among leading products and continue to effectively differentiate for consumers
  - Production cycles and other industry factors
- Key elements of the stakeholder process:
  - Consistency, transparency, inclusiveness, responsiveness, and clarity
  - Stakeholder engagement is a vital aspect to the success of the ENERGY STAR program



View at: ENERGY STAR Product Specification Development Efforts

ENERGY STAR Specification Development Process



https://www.energystar.gov/partner_resources/product_specification_development_process

History of the ENERGY STAR AV Specification

Date	Event
April 2001	Version 1.0 Effective - designed to address stand-by energy use for consumer AV products
November 2009	Version 2.0 Effective – Idle and Active State criteria developed for consumer and commercial AV products
May 2013	Version 3.0 Effective – revised allowances and Active State criteria for video products and amplifier efficiency
June 2017	Version 4.0 Discussion Document Published – focused on addressing testing concerns
August 2021	ANSI/CTA-2084-A Test Method for Determining Audio/Video Energy Efficiency Published
September 2021	Version 4.0 Data assembly deadline
October 2022	Draft 1 Specification published

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ANSI/CTA-2084-A 2021 Test Method Summary

- Pink Noise signal generated at several power levels for more realistic assessment of product use
- Requires that all channels be connected and tested simultaneously
  - prior test measurement at 1/8 MUP may not have captured all channels
- Amplifiers are tested at the full range of volume functionality to account for:
  - non-linear relationship between power and sound level
  - different product applications have different volume levels in typical use
- Measures two separate One Mode Idle States:
  - 1) where there is no input signal, but the volume is set to a nonzero volume and 2) where there is an active input signal, but the volume is set to zero
  - the two Idle State Measurements are repeated without voice-recognition (if it can be disabled)

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Definitions

- Removed the redundant Audio Signal processing definition in harmonization with the CTA test method.

~~1) Audio Signal Processing: A function by which a device modifies an audio signal for a purpose other than amplification.~~

- Proposed the definition for Tower/ PA system to better define product types included in the specification.

1) Tower/PA system: A public address system used to project sounds from instruments and other acoustic sources.

Is the Tower/ PA system definition accurate?

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Scope: Excluded Products - Examples

- Products covered under separate ES specs
  - Displays
  - Lighting
  - Computers
  - Game Consoles
  - STBs
- Products with an IP video tuner (web video device)
- Products for use in automotive applications
- Video Projectors
- Smart Speakers
- Smart Displays
- Home and Building automation and control products
- Whole-House and Building AV systems
- Videoconferencing Systems
- Wireless Microphone Systems
- Media Server
- A/B Selector Switching

Scope

- Why are Smart Speakers excluded?
  - Key component of a smart home.
  - ENERGY STAR SHEMS specification
  - Consumer confusion and labeling
- Why are battery powered products included?
  - CTA test method allows for the same

Should EPA consider adding whole building AV systems to the specification?

- CAT 5E/ fiber optic cables
- Coupled automation systems

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Challenges with the Current EPA Dataset

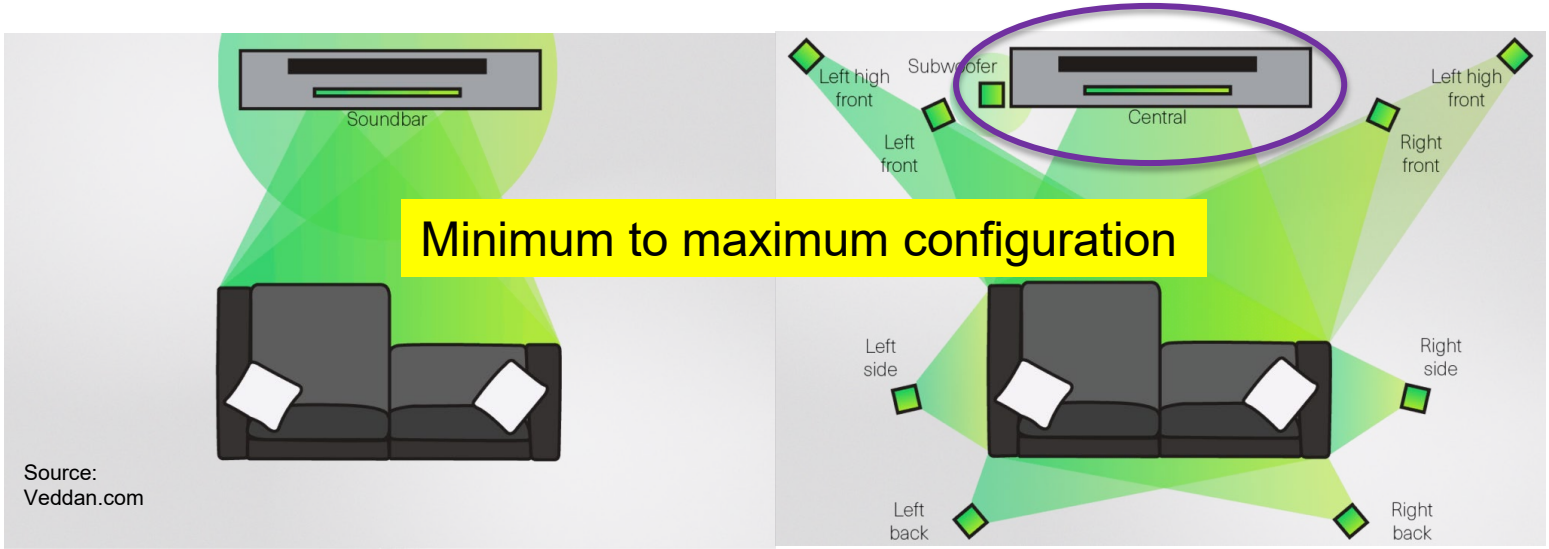
- Insufficient number models tested to new test method to conduct a complete analysis of all modes and overall pass rate
  - Sleep Mode for all products and Active Mode for Optical Disc Players are the only modes for which the test method did not change
  - Stakeholders did not submit any data for Standalone Amplifiers
  - EPA testing from several years ago to Draft CTA included only a few Commercial Standalone Amplifier models that cannot be directly compared to set levels
- The existing V3 Idle State criteria provides an amplifier allowance based on 1/8 MUP efficiency measurement
  - There is no equivalent amplifier allowance that can be applied to the V3 dataset based on the new test method approach
  - Stakeholders will need to comment or provide data on how amplifier performance should be considered in V4
  - For Draft 1, EPA has proposed placeholder Idle State levels based on the V3 test method with criteria based on new test method to be determined in Draft 2

Challenges: Multi-component Systems

Version 3.0 Definition

Multi-component System: A product consisting of several components with separate enclosures that are sold as and intended for use as a single system. A “Home Theater in a Box” is an example of a Multi-component System.

- Example: same soundbar product could theoretically ship-as or installed in various configurations – **difficult to identify on ES Product Finder**
- **Soundbar + Subwoofer** shipped in one box purchased by as consumer likely represents the most numerous combination in terms of units sold



Multi-component System Feedback & Proposals

- In V3, all enclosures of a system are tested and certified against the requirements separately
- When beginning to constrain power and efficiency limits, some components pass while others fail
  - 13 instances of this in the current QPL (15% of products)
  - This forces large assumptions when understanding actual energy use of Soundbar systems as they are sold
- In response to V4 2017 launch, utilities commented that EPA should certify and report all enclosures of a system together—the Soundbar + Subwoofer combination is the most common and important configuration for reporting total energy use

How does EPA assess On Mode for systems with multiple speakers where the combined sound pressure level of all the speakers is measured (large central soundbar + multiple smaller speakers = total sound)?

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Version 4.0 Approach to Efficiency Requirements

- Require that all Consumer models Auto Power Down after 30 minutes to meet Sleep Mode criteria
  - Commercial models like Standalone Amplifiers are exempt
- Require all models to meet Active, Idle, and Sleep modal power criteria
  - Set more stringent Idle and Sleep criteria for all products
  - Set minimum Active criteria based on new test method designed to capture approximately half of the models
- Revise allowances:
  - Eliminate networking allowances – most product have networking capability at baseline and technology has progressed significantly over the past decade

Not enough data to assess other performance features (drivers, internal subwoofer) or voice-activation – stakeholders may comment or submit additional data to inform Draft 2 criteria

Revised Product Classification

- V3 currently labels most speakers as "amplifiers" – difficult for consumers and utilities to know which products are soundbars, wireless speakers, etc.
- V4 Draft 1 proposes a classification of three major product types and their subtypes for display on the QPX/QPL

Speakers and System Components

1) Wireless Speakers
   - Wireless Speaker without Battery
   - Portable Speaker
2) Home Theater/Display System
   - Home Theater/Display Soundbar
   - Home Theater/Display Subwoofer
   - Home Theater/Display Auxiliary Speaker
3) Stereo System
   - Tower/PA System Speaker
   - Tower/PA Subwoofer
   - Bookshelf Speaker
   - Bookshelf Subwoofer
4) Other

Standalone Amplifiers

1) Commercial
2) Consumer

Optical Disc Players

1) DVD
2) Blue-ray

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Auto Power Down Requirements

APD functionality shall be enabled by default, with APD timing less than or equal to 30 minutes, subject to the following exceptions:

i. Products may offer users the option (e.g., via system menu or physical switch) to modify APD timing in 10-minute intervals, or to disable APD entirely.

ii. Products may initiate APD immediately upon receipt of authoritative control instruction via an active Networking / Control Protocol.

iii. Commercial Amplifiers as defined in Section 1 may be shipped with APD enabled or disabled but shall meet the Idle State power requirements.

APD Timing Default Settings shall be as follows:

i. APD Timing ≤ 30 minutes: This timing option is acceptable for use as a default setting. Irrespective of the APD timing, Idle State power requirements are applicable for all products.

ii. APD Timing > 30 minutes: This timing option may only be enabled by the end user and is not available for use as a default setting.

- Commercial amplifiers may be shipped with APD enabled or disabled.
- Idle State power requirements shall be met irrespective of APD timing default setting.
- Mass notification, Emergency Communication and ANSI/ UL 2572 systems are exempt

V4 Draft 1 Idle State and Sleep Mode Criteria

IDLE STATE POWER ALLOWANCES			
		V3	V4 Draft 1
Base (All Products)		5	4
In-use Networking / Control Protocol		1	0
In-use Wi-Fi or Gigabit Ethernet Protocols		2	0
Audio Amplification Allowance Where: POUT is the output power at 1/8 MUP PLACEHOLDER UNTIL FURTHER DATA AND FEEDBACK RE: NEW TEST METHOD	If Output Power <= 50 W	5	2.00
	If Output Power > 50 W	0.1	0.02

SLEEP MODE POWER ALLOWANCES		
	V3	V4 Draft 1
Base Allowance	1	1
In-use Networking/Control Protocol with Wake Capability	1	0
In-use Wi-Fi or Gigabit Ethernet Protocols with Wake Capability	2	0

- Intended to apply to all Product Types in V4 for simplicity.
- Reduced base allowance in Idle mode.
- 40% more savings in Idle mode across all products
- Eliminated networking allowances in both Idle and Sleep modes.

Stakeholder feedback requested on proposed criteria with any data supporting the claims.

Market Share of V3 Specification

- 2020 ENERGY STAR Unit Shipment Data

ENERGY STAR Market Share	
	Current
Product	2020
AV - Bluray and DVD	66%
AV - Bluray	70%
AV - DVD	58%
AV - Soundbars	12%

- Market Share data indicate criteria for Optical Disc Players can be stringent to identify only the top performing DVD/Blu-ray players still being sold today

Stakeholder feedback requested:

Standalone Amplifier and Speakers and System Components products other than Soundbars are not reflected in above data.

Soundbar Market Share could be an underestimate?

Idle and Sleep Pass Rates by Product Type for V3 QPL Models Only

Speakers and System Components							
		Idle State		Sleep Mode		Idle + Sleep	
Subtype	Total	Passing	%	Passing	%	Passing	%
Portable Wireless Speaker	3	2	67%	3	100%	2	67%
Wireless Speaker without Battery	8	6	75%	6	75%	4	50%
Soundbar	133	75	56%	94	71%	56	42%
Home Theater/Display Subwoofer	34	27	79%	31	91%	24	71%
Home Theater/Display Auxiliary Speaker	9	9	100%	9	100%	9	100%
Tower/PA System Speaker	3	0	0%	1	33%	0	0%
TOTAL	**190**	**119**	**63%**	**144**	**76%**	**95**	**50%**

Idle + Sleep column is the # and % of models meeting both modes

<- less stringent pass rate for Soundbars OK due to low market share (12%)

Optical Disc Players							
		Idle State		Sleep Mode		Idle + Sleep	
	Total	Passing	%	Passing	%	Passing	%
Blu-ray	31	7	23%	31	100%	7	23%
DVD	12	8	67%	12	100%	8	67%
TOTAL	**43**	**15**	**35%**	**43**	**100%**	**15**	**35%**

<- more stringent pass rate for Optical Disc Players due to higher market share (66%)

Average Idle State Power and % Improvement for V3 QPL Models Meeting V4 Draft 1 Criteria

Speakers and System Components			
Subtype	Not Passing (W)	Passing (W)	% Improvement
Portable Wireless Speaker	8	2	71%
Wireless Speaker without Battery	29	4	88%
Soundbar	8	4	50%
Home Theater/Display Subwoofer	7	2	66%
Home Theater/Display Auxiliary Speaker	-	2	-
Tower/PA System Speaker	10	-	-
ALL	**8**	**3**	**39%**

<- 5 W savings

Optical Disc Players			
	Not Passing (W)	Passing (W)	% Improvement
Blu-ray	6	4	26%
DVD	5	3	45%
ALL	**6**	**3**	**37%**

<- 3 W savings

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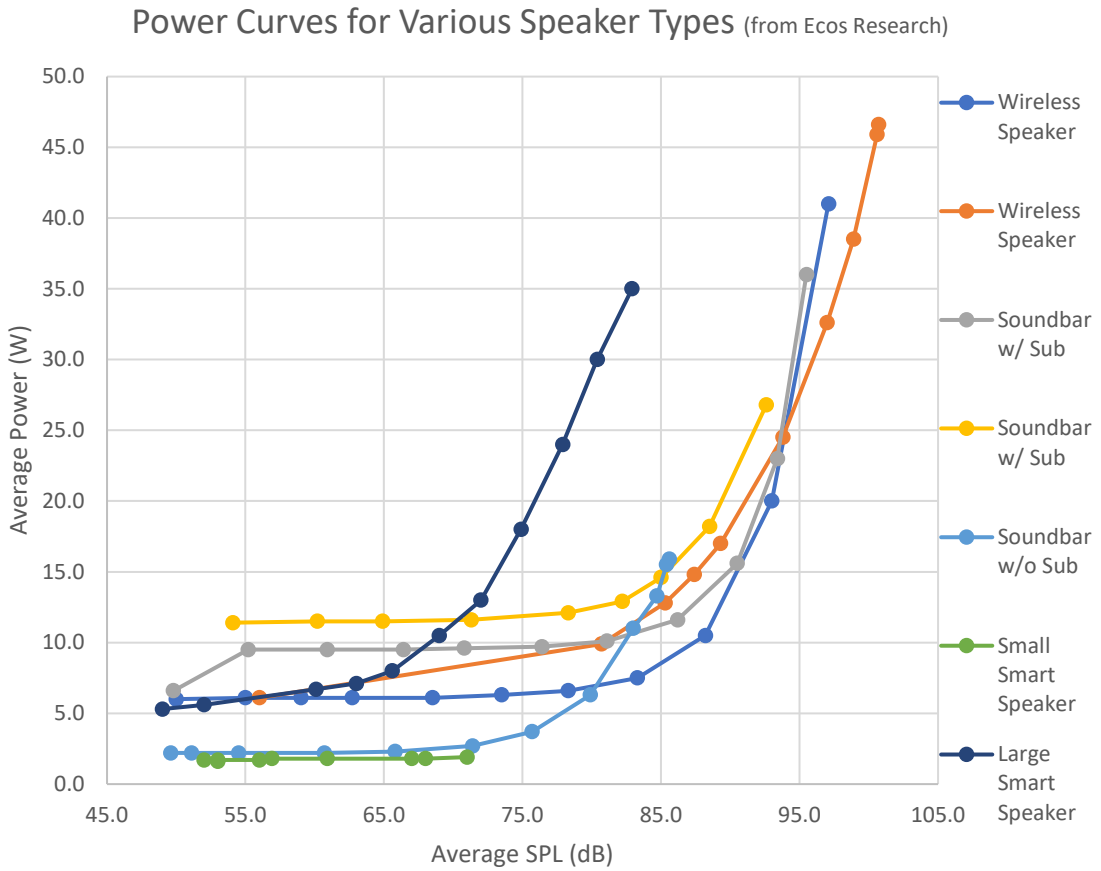
V4 Draft 1 On Mode Criteria- Powered Speakers

- Intended to apply to following product types:
  - Portable Wireless Speaker
  - Wireless Speaker without Battery
  - Soundbar
  - Home Theater/Display Subwoofer
  - Home Theater/Display Auxiliary Speaker
  - Tower/PA System Speaker, Tower/ PA System Subwoofer <100W driver power
- Standalone Amplifiers: TBD
- Multicomponent Systems: On mode criteria N/A

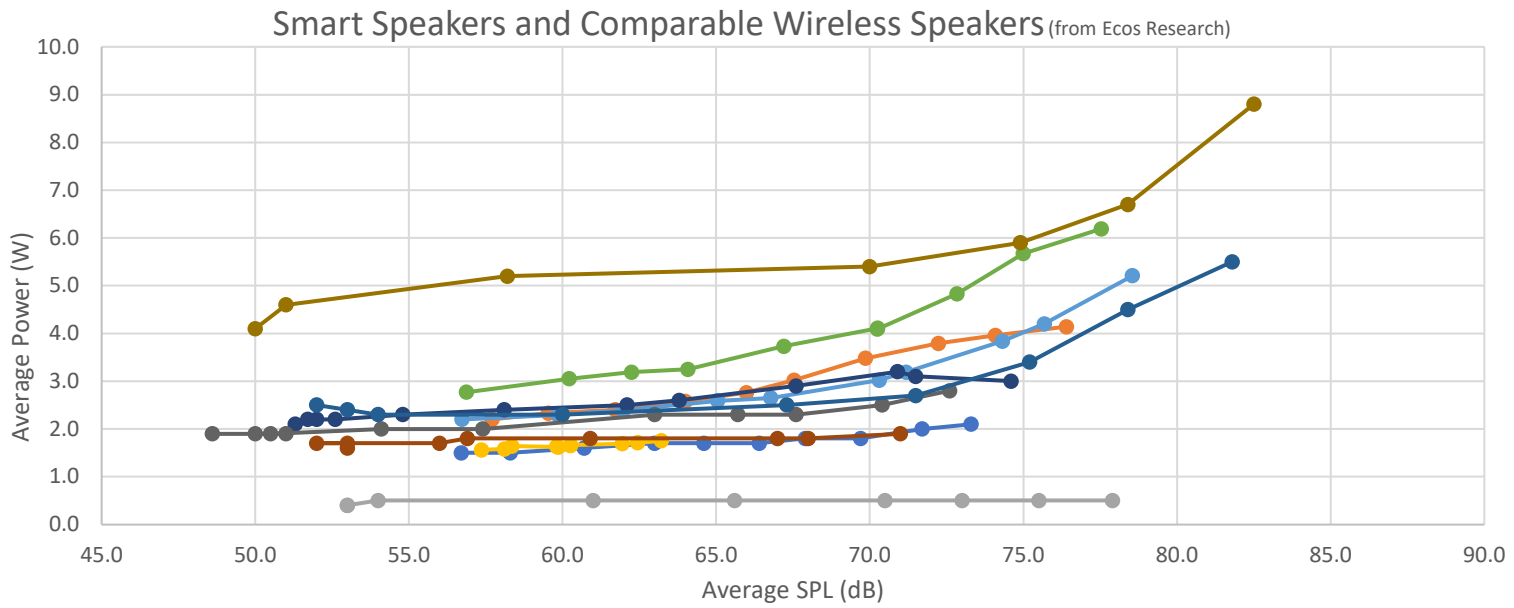
On Mode Criteria- Products with amplification shipped with speakers

- From the limited testing done with the proposed V4.0 method, Soundbars combined with a Subwoofer perform similarly to high performance wireless speakers (which usually include a tweeter and woofer in a single housing)
  - Affirms the presumption that the driver quantity is a large factor in TEC



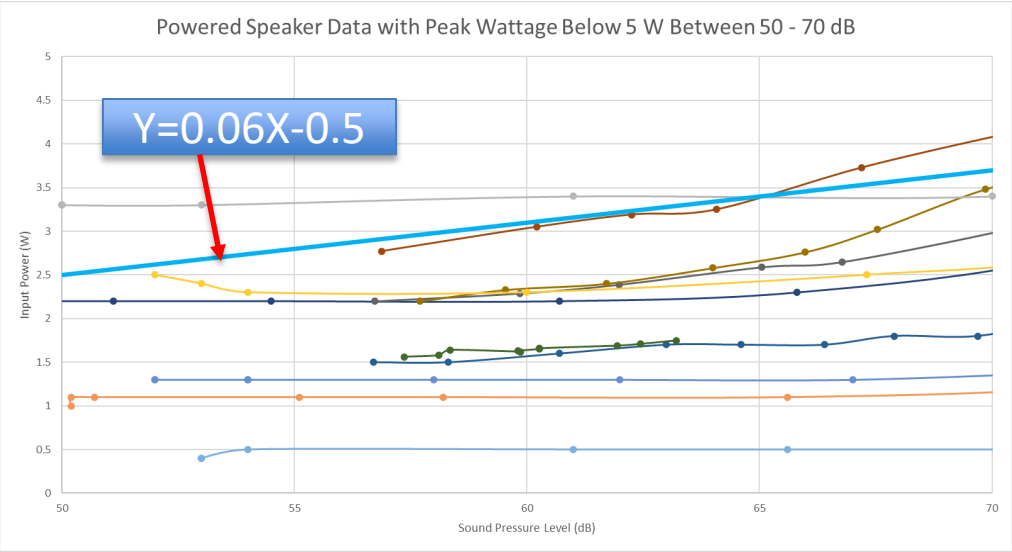
On Mode Criteria- Products with amplification shipped with speakers

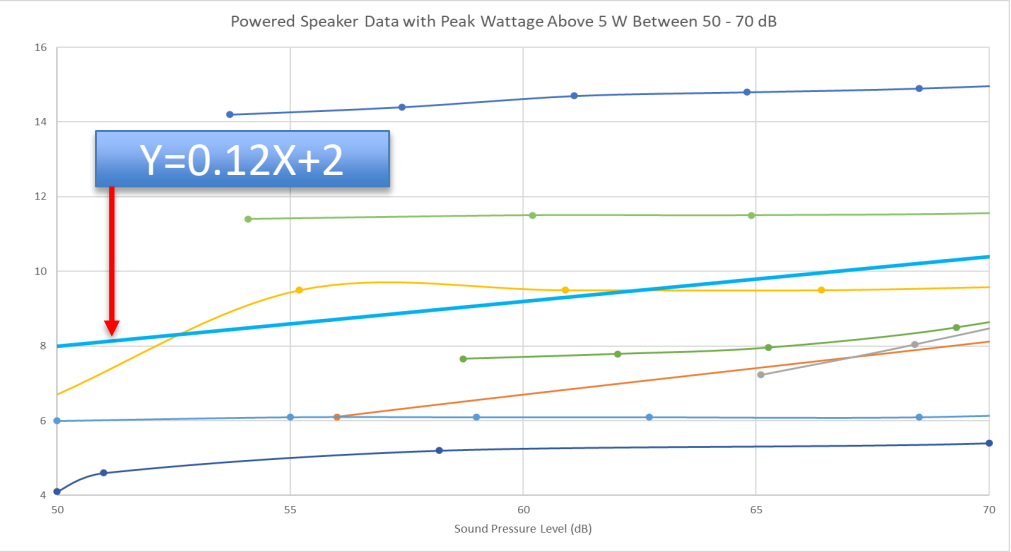
- The same testing shows that there is no apparent performance difference in speakers that employ digital assistant hosting capability when compared to similarly sized/marketed speakers
- These smaller speakers lack the steep power curve indicative of the presence of a woofer



On Mode Criteria- Products with amplification shipped with speakers

- Criteria for powered speakers based on 50-70 dB SPL (most common usage range)
- Classification into two categories as indicated below:





V4 Draft 1 On Mode Criteria- Optical Disc Players

OPTICAL DISC PLAYER ON MODE ALLOWANCES				
			V3.0	**V4.0 Potential**
SD or Audio Source Optical Disc Player: Playback Test Base Allowance			6	4.5
SD Source to HD Output "Upconversion" Optical Disc Player: Playback Test Base Allowance			10	4
HD Source Optical Disc Player: Playback Test Base Allowance			10.5	5.4
High Resolution Display			On Mode Power = (6*R)+(0.05*A)+3	On mode power = [(4*10^-5*I*A)+119*tanh(0.0008*[A-200]+0.11)+6]
In-use Networking/Control Protocol			1	0
In-use Wi-Fi or Gigabit Ethernet Protocols (Applied to Either Wi-Fi or Gigabit Ethernet, but Not Both Simultaneously)			2	0
Audio Amplification Place holder		If Output Power <= 50 W	5	2
		If Output Power > 50 W	=0.1*Output Power	0.02 * Output Power

- Updated equation for High Resolution Display in consistency with other products
  - A is the screen area in square inches
  - I is the maximum measured luminance of displays in candelas per square meter
  - tanh is the hyperbolic tangent function

V4 Draft 1 Pass Rates- Optical Disc Players

Product Type	Total Number of Models in Dataset	Total Number of Models Meeting V4.0 on mode Criteria	Expected Pass Rate V4.0 Release
Video Equipment	**43**	**8**	**19%**
Blu-ray	31	5	16%
DVD	12	3	25%

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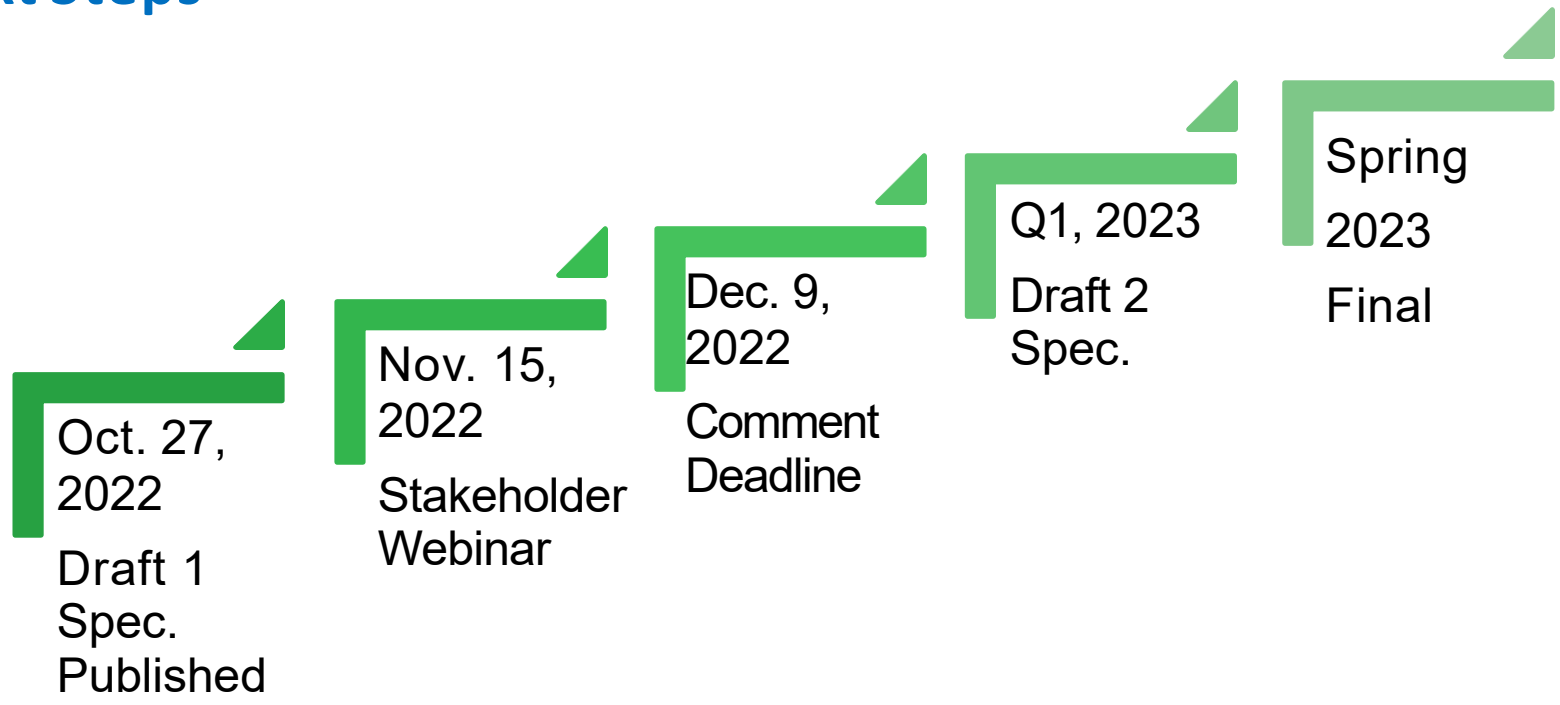

Follow the development process on the product development webpage

Thank You!

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Stakeholders are encouraged to provide written comments for consideration to audiovideo@energystar.gov by December 9, 2022.

Unless marked as confidential, all comments will be posted to the AV product development page at: https://www.energystar.gov/products/spec/audiovideo_specification_version_4_0_pd