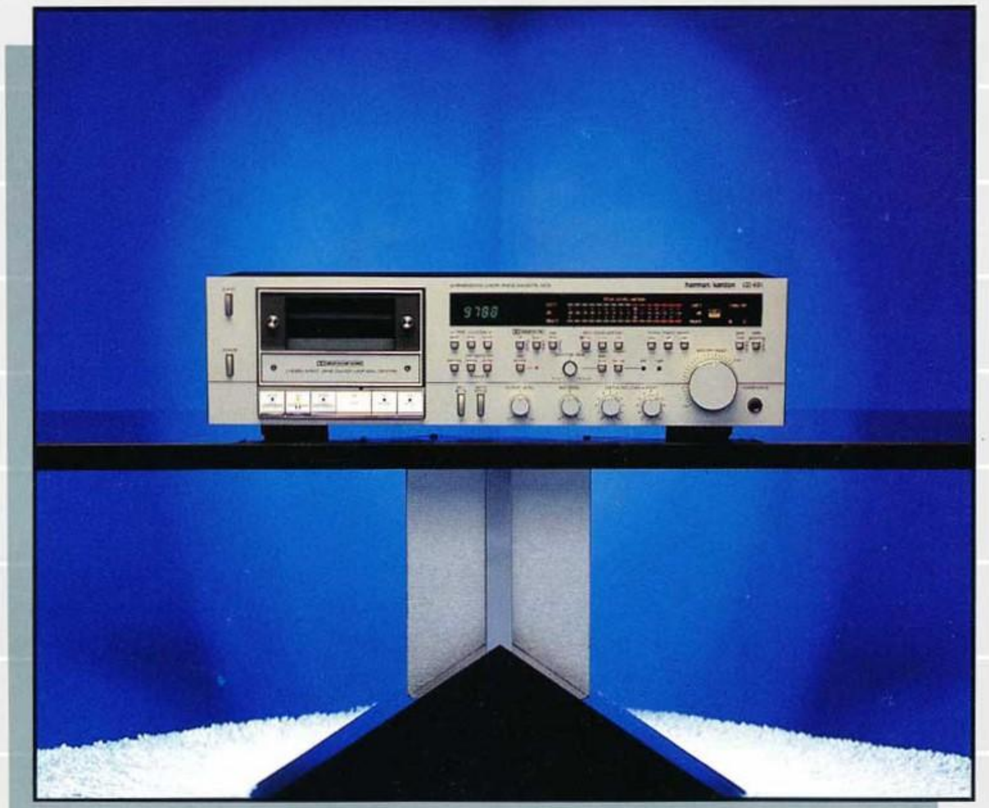
CASSETTE DECKS



harman/kardon

Introduction

Harman Kardon, State-Of-The-Mind Technology.

Thirty years ago Harman Kardon introduced the world's first high fidelity receiver. It was built on the philosophy that quality audio must evolve from creative, quality thinking.

Over the years, Harman Kardon continued to introduce original audio theories that were truly "state-of-the-mind," each proving so successful that it was immediately absorbed into the marketplace as "state-of-the-art."

For example, in 1958, Harman Kardon developed the first stereo receiver. A state-of-the-mind theory that instantaneously became state-of-the-art.

In the '60s Harman Kardon introduced a unique concept, Ultrawideband Frequency Response. Today, it's an established fact of sonic quality. One of Harman Kardon's most significant contributions was the introduction of the first cassette deck with Dolby B* noise reduction circuitry back in the early 1970's, perhaps the single most important development in making the cassette deck a viable component for the serious audiophile.

This total commitment to state-of-the-mind audio excellence continued in 1980 when Harman Kardon was the first manufacturer to incorporate Dolby HX* circuitry in cassette decks. This circuitry increased high level, high frequency response and decreased distortion due to saturation. In 1982, Harman Kardon incorporated Dolby HX Professional*, a further refined headroom expansion system.

20Hz To 20kHz Frequency Response.

For nearly a century, it has been known that the range of human hearing extends from 20Hz to 20kHz. It's generally accepted that stereo components have had to deliver this range in order to be considered high fidelity.

Until now, only a handful of the most expensive cassette decks have been able to accurately reproduce the entire frequency range. The drawback was that these cassette decks often cost more than the rest of your entire system.

Now Harman Kardon state-of-the-mind technology offers the CD series of cassette decks, the first full line of decks to equal the range of human hearing.

Every deck in the CD line matches or exceeds the frequency range of human hearing to an accuracy of ±3dB. Other manufacturers may quote seemingly similar upper and lower frequency response specifications, however, they don't mention the ±3dB tolerance. Without the tolerance specified, these limits can be greatly exaggerated and therefore misleading. With Harman Kardon cassette decks, the deepest bass reverberations at 20Hz to the highest shimmering overtones at 20kHz are captured with any tape formulation, not just expensive metal tape. Other manufacturers can only achieve this frequency response with metal tape.

The Cassette Deck Challenge.

In the recent nationwide "Harman Kardon Cassette Deck Challenge" test equipment that would measure frequency response was set up in local dealers. Individuals were then challenged to bring in their deck and match it against the Harman Kardon cassette decks. After an overwhelming response the results were as expected. Few, if any, could match the frequency response of the Harman Kardon cassette deck. The 2% that managed to surpass Harman Kardon cost significantly more.

Attention To Design Fundamentals.

The extended frequency response of the CD series comes in part from Harman Kardon's dedication to sound quality rather than unnecessary gimmicks. Each deck, for instance, uses selected, high quality heads that are machined to demanding tolerances and aligned with extraordinary precision. These steps are time consuming and expensive, but totally necessary for the wide, flat frequency response Harman Kardon demands.

The equalization and bias circuitry in a cassette deck also dramatically effects the frequency response and overall sound quality. Harman Kardon cassette decks use a bias frequency of 105kHz as opposed to 85kHz and an extended record equalization of 23kHz-27kHz versus 16kHz-18kHz. While most manufacturers design their circuits to make production simpler, we design ours to give you the best possible performance. Again, a costly but necessary step.

Frequency Response Test Report Sheet.

Our commitment to the discerning audio consumer goes so far as to include in each Harman Kardon deck a frequency response test data sheet. This data sheet confirms the ultrawideband response of each individual deck and is signed by the technician who performed the test.

Dolby HX Professional* optimizes high frequency response. At low recording levels (−20 dB) carefully engineered tape heads and circuitry are enough to ensure accurate high frequency response. However, at 0 dB and above, the level at which most recording is done, another solution is needed because high level recording can cause tape saturation. Expensive metal tape can partially solve this problem. Harman Kardon wanted a better solution than expensive tape, so the CD291, CD391 and the CD491 incorporate Dolby HX Professional.* This feature actually raises the overload level of low-noise and chromium dioxide tapes, plus further improves the response of metal tape. By continuously monitoring and optimizing bias current, Dolby HX Professional* gives you more high frequency headroom to avoid the harshness that occurs when tape becomes saturated. The combination of Dolby HX Professional,* Dolby C* and metal tape results in a frequency response of 20Hz to 20kHz ± 3dB at the 0 dB level. This performance often equals or surpasses open reel recorders.

A cassette recorded with Dolby HX Professional* needs no decoding, so you can enjoy its improved sonic performance on any cassette player you own.

Dolby C* Noise Reduction Keeps Tape Hiss Inaudible.

Until recently, a major limitation of the cassette medium has been tape hiss, which can be audible during softer passages of music or even mask them entirely.

The standard Dolby B* noise reduction circuitry found on all Harman Kardon decks helps to reduce tape hiss considerably.

In addition to this, Dolby C* noise reduction circuitry,

found on our top four decks, provides twice the effect of Dolby B* – this drops noise well below the level of audibility.

Ultrawideband Record And Playback Electronics.

In order for Harman Kardon cassette decks to provide a wide, flat frequency response, we developed record EQ circuits that extend high frequency compensation to as high as 26kHz. In contrast, most decks on the market today, including many high priced models, have record EQ that extends to only 16kHz or 18kHz. Consequently, their frequency response rolls off sharply beyond that point.

Playback amplifier circuits boost the weak signals at the output of the tape heads. In the Harman Kardon tradition, the CD series playback electronics have been designed with ultrawideband circuitry that extends well beyond the audible range. This means a range from 10Hz to 100kHz, compared with conventional narrowband designs that barely exceed the 20Hz-20kHz range.

Ultrawideband electronics allow our decks to respond instantly to transients, such as the crash of a cymbal or the attack of a piano. The same ultrawideband circuitry also improves stereo imaging, allowing you to "place" the various instruments in space – exactly as they appeared in the original live performance.

Closed-Loop Dual Capstan Transport With Twin Flywheels.

In order for a cassette deck to provide accurate sonic reproduction, it must move the tape across the heads at a consistently, steady rate. In models CD391 and CD491, Harman Kardon accomplishes this by isolating the tape between two capstans, one on either side of the heads. Each capstan is stabilized by its own flywheel, and the two flywheels are belt-coupled so that they turn in unison. This assures that the tape is drawn from the supply side of the cassette at the same speed thatit is returned to the take-up side. In this way, the tape tension between the capstans is independent of external factors, such as manufacturing defects in the cassette shells.

In order to precisely turn the dual flywheels, an improved drive system is used. The take-up side flywheel is made of ferrite magnetic material and acts as the magnet of the motor and is directly driven. The electric coils that cause the motor to turn are mounted directly behind the magnetic flywheel. A sophisticated servo control circuit drives the coils to further assure smooth, drift-free tape speed.

The result is extremely low wow-and-flutter (0.025% WRMS) and improved sonic clarity.

Solenoid Controls On All Our Decks Give Smooth, Trouble-Free Performance.

Many companies use solenoid controls only on their most expensive tape decks. At Harman Kardon, we use them on all models. They're not only more convenient, allowing you to switch directly from mode to mode without stopping, they also decrease the chances of tape jamming in the transport mechanism.

Defeatable On-Off MPX Filter For Clean Recording From Any Source.

The MPX (stereo decoding) section of older or lower-priced receivers and tuners can add a steady 19kHz tone to FM stereo signals. As this tone tends to interfere with Dolby* encoding during recording, many cassette decks today have built-in MPX filters. However, this filtering is unnecessary and seriously limits the bandwidth if one is recording live, from discs digital audio sources, or with new high quality receivers and tuners. For this reason all Harman Kardon cassette decks have an on-off MPX filter switch.

Bias Trim Control For The Ultimate In Fine Tuning

Most cassette decks let you select a bias level for the specific type of tape you're using – metal, chromium dioxide, ferrichrome, or low noise. But, tape formulations vary from manufacturer to manufacturer, which means the bias setting that's right for one brand of tape is not quite right for others. But on our CD191, CD291, CD391 and CD491 decks, once you've selected the proper bias button for the type of tape you're using, you can fine-tune the bias even further for optimum recording quality.

Our CD391 and CD491 decks also include a special bias tone generator, which helps make precise bias fine tuning quick and easy.

Bi-Directional Electronic Auto Search And Memory System.

Harman Kardon's electronic auto search system lets the user scan a tape automatically to locate the next musical passage. With the electronic auto search activated, the deck will scan forward or reverse, to the beginning of the next selection. A unique auto-space may be used in the recording mode. This feature creates a 3 second blank space that can easily be detected by the auto search system. This is especially useful when recording from several different sources.

There is also a memory search system that allows the user to return to any preset point on the tape automatically when in the fast forward or rewind mode.

16 Segment Peak Meter Display.

A 16 segment peak meter display allows for more accurate level indication ranging from −30dB to +10dB. To aid the user in setting optimum recording levels, Harman Kardon decks incorporate a unique meter weighting feature which measures the frequency content of the music. It references the overload level of the tape to a +3dB reading. This allows the user to easily set the record levels as high as possible, without tape saturation. In order to accurately monitor the level of a dynamic source, a peak hold feature is provided. It sustains peak level indications long enough to be observed.

State-Of-The-Mind Cassette Decks.

The following pages of this brochure will detail the full line of Harman Kardon cassette decks. Only Harman Kardon cassette decks exceed the limitations of today's "state-of-the-art" and become "state-of-the-mind"; a way of thinking that goes beyond today's technology and seeks tomorrows.

While other manufacturers continue to pile on unnecessary features and gimmicks, Harman Kardon continues to fine tune the basics and develop fundamentally advanced audio equipment.

Harman Kardon, our state-of-the-mind is tomorrow's state-of-the-art.

*Dolby is the registered trademark of Dolby Laboratories, Inc.

CD91

Traditionally entry-level cassette decks have competed with one another by offering features that are cosmetically appealing, but, unfortunately, musically irrelevant. The CD91 is a striking exception to that tradition.

The Harman Kardon CD91 is one of the few decks in the world with the ability to reproduce sounds over the entire range of human hearing. Harman Kardon's Ultrawideband technology provides the CD91 with a frequency response of 20Hz to 20kHz (±3dB), using any tape formulation. The signal-to-noise ratio with Dolby B[1] is 65dB and the wow-and-flutter is a mere 0.05%.

Adding to the CD91's uniqueness are a host of additional features. It has a Sendust record/playback head for long life and dependable performance at high recording levels. It has an MPX filter switch, metal tape capability and sophisticated record and playback circuitry for open, transparent sound. Solenoid Controls provide the type of smooth transport operation usually found only on cassette decks in price ranges far above that of CD91. Solenoid Transports are also more convenient; they allow for switching directly from one mode to another without stopping. They also decrease the chances of tape jamming in the transport mechanism.

The CD91. Unprecedented performance in a deck of this category.

[1]Dolby is the registered trademark of Dolby Laboratories, Inc.


ULTRAWIDEBAND LINEAR PHASE CASSETTE DECK
harman/kardon CD 91
EJECT
POWER
SENDUST HEAD UNIPLANE TRANSPORT
rec
pause
left
right
Dolby NR
operate
reset
STOP
PLAY
REW
F.FWD
REC
PAUSE
DOLBY SYSTEM
NR
off
on
mpx filter
on
off
INPUT LEVEL
BALANCE
left
right
HEADPHONES
BIAS/EQUALIZATION
METAL
CrO2
LN
70 µsec
70 µsec
120 µsec
0
40

CD191

345.00

The CD191 provides a quality of sound that is rare even in the most esoteric equipment. The CD191 is able to achieve exceptional sound by combining Ultrawideband response and Dolby C[1] noise reduction circuitry.

The frequency response on the CD191 is a spectacular 20Hz to 20kHz (±3dB) with any tape formulation. This assures an exceptionally faithful reproduction of music throughout the entire audio band. With the addition of Dolby C, the signal-to-noise ratio is 73dB, making tape noise inaudible. Bias fine trim permits precise adjustment for any type of tape.

The CD191 also incorporates features that deliver extra convenience and added control for recordings. The auto repeat feature enables the machine to automatically rewind and replay a tape once it has reached the end. Microphone inputs are featured, as well.

The CD191. It's simply superior.

[1]Dolby is the registered trademark of Dolby Laboratories, Inc.


ULTRAWIDEBAND LINEAR PHASE CASSETTE DECK
harman/kardon CD191
EJECT
POWER
SENDUST HEAD UNIPLANE TRANSPORT
POWER
REC
PAUSE
left
right
Dolby NR
B
C
reset
STOP
PLAY
REW
F.FWD
REC
PAUSE
HEADPHONES
BIAS/EQUALIZATION
METAL
CrO2
LN
70 µsec
70 µsec
120 µsec
DOLBY B-C NR
NR
off
on
B
C
mpx filter
on
off
autorepeat
bias
fine trim
input
balance
input selector
line
mic
hicut
hiboost
left
right
INPUT LEVEL
0
40
MICROPHONES
left
right

CD291

Every tape recording enthusiast will be amazed at the performance of Harman Kardon's CD291 cassette deck. The Ultrawideband deck delivers a full frequency response of 20Hz to 21kHz (±3dB) with any tape formulation.

Incorporated in the CD291 is Dolby HX Professional[1], a headroom extension system that extends frequency response at high record levels, while significantly reducing distortion. Added to this is a signal-to-noise ratio with Dolby C[1] of 73dB. Using metal tape with Dolby C[1] and Dolby HX Pro[1], the CD291 provides a high level (0dB) frequency response of 20Hz to 20kHz (±3dB). The dramatic result of this is the ability to accurately record more dynamic audio signals than was previously possible. This is especially significant as more demanding forms of software, such as digital audio, emerge.

Also offered on the CD291 are advantages rarely found in decks in its category. The Sendust record/playback head assures dependable performance at high record levels. A memory tape counter is included, as is record mute, which gives silent passages between selections. Sophisticated record and playback circuitry deliver open, transparent sound; Solenoid Transport assures smooth operation; auto repeat automatically rewinds and plays the tape; and bias fine trim maximizes high end performance and minimizes distortion.

The CD291. A remarkably sophisticated cassette deck.

[1]Dolby is the registered trademark of Dolby Laboratories, Inc.


ULTRAWIDEBAND LINEAR PHASE CASSETTE DECK
harman/kardon CD 291
EJECT
POWER
SENDUST HEAD UNIPLANE TRANSPORT
DOLBY B-C NR HX PRO
POWER
REC
PAUSE
left
right
Dolby NR
HX PRO
reset
STOP
PLAY
memory
REW
FF WD
REC
PAUSE
HEADPHONES
BIAS/EQUALIZATION
METAL
CrO2
LN
70 μsec
70 μsec
120 μsec
DOLBY B-C NR
NR
off
on
B
C
mpx filter
on
off
rec mute
auto repeat
bias
fine trim
input
balance
input selector
line
mic
hicut
hiboost
left
right
INPUT LEVEL
0
40
MICROPHONES
left
right

CD391

Harman Kardon's state-of-the-mind technology is exemplified in the CD391. Its frequency response is an almost unheard of 20Hz to 22kHz (±3dB), with any tape formulation.

The CD391 also offers the advantages of Dolby HX Professional[1], which delivers greatly enhanced frequency response at high record levels, with significantly reduced distortion. Added to this is a signal-to-noise ratio with Dolby C[1] of 74dB. Using metal tape with Dolby C[1] and Dolby HX Pro[1], the CD391 provides a high level (0dB) frequency response of 20Hz to 20kHz (±3dB). The dramatic result of this is the ability to accurately record more dynamic audio signals than was previously possible. This is especially significant as more demanding forms of software, such as digital audio, emerge.

To indicate the optimum record level, the CD391 has a unique meter weighting feature which measures the frequency content of the music and is backed by a 16-segment peak level meter ranging from −30dB to +10dB.

The CD391 also offers a highly precise closed-loop, dual capstan, dual flywheel transport and a third motor to gently raise and lower the head assembly. It also has bi-directional auto-search; peak hold; independent left and right level controls; and master fader.

Special Harman Kardon features found on the CD391 also include tone generators for bias trim and record calibration that allow alignment of bias and Dolby[1] levels with virtually any tape. Sendust record/playback head, mic/line mixing, solenoid operation, timer controllable functioning, record, mute and auto space are all featured on the CD391.

The Harman Kardon CD391. Setting state-of-the-mind technology's new standards.

[1]Dolby is the registered trademark of Dolby Laboratories, Inc.


ULTRAWIDEBAND LINEAR PHASE CASSETTE DECK
harman/kardon CD 391
EJECT
POWER
counter
PEAK LEVEL METER
LEFT
dB
RIGHT
Dolby NR
HX PRO
B C
DOLBY B-C NR
NR off on
type B C
mpx filter on off
BIAS/EQUALIZATION
METAL CrO2 LN
70μsec 70μsec 120μsec
bias tone
rec cal
BIAS FINE TRIM
hi cut
+ hi boost
TIMER
play off rec
left right
peak hold off on
meter weighting off on
reset
AUTO
memory rewind replay
repeat
MASTER FADER
min max
HEADPHONES
DOLBY B-C NR HX PRO
2 HEADS/DIRECT DRIVE/CLOSED LOOP DUAL CAPSTAN
REW AUTO SEARCH
PLAY
F.FWD AUTO SEARCH
STOP
RECORD
PAUSE
REC MUTE
AUTO SPACE
OUTPUT LEVEL
MIC LEVEL
LEFT — REC LEVEL — RIGHT

CD491

The CD491 is Harman Kardon's most sophisticated state-of-the-mind cassette deck and one of the few in the world that can equal the range of human hearing. Its frequency response is an unparalleled 20Hz to 24kHz (±3dB) with any tape formulation. An audiophile would settle for nothing less.

Incorporated in the CD491 is Dolby HX Professional[1], a headroom extension system that extends frequency response at high record levels, while significantly reducing distortion. Added to this is a signal-to-noise ratio with Dolby C[1] of 75dB. Using metal tape with Dolby C[1] and Dolby HX Pro[1], the CD491 provides a high level (0dB) frequency response of 20Hz to 20kHz (±3dB). The dramatic result of this is the ability to accurately record more dynamic audio signals than was previously possible. This is especially significant as more demanding forms of software, such as digital audio, emerge.

The CD491 has three heads for improved performance and the convenience of monitoring while recording. The Sendust record head withstands high record levels without overload, and the ferrite play-back head assures extended high frequency response. Both heads are precisely aligned in one housing.

In addition, the CD491 has dual Dolby B[1] and C[1] noise reduction. Its tone generators for bias trim and record calibration allow for alignment of the bias and Dolby[1] level to virtually any tape.

The CD491 also features a unique meter weighting system which measures the frequency content of the music and indicates the optimum record level on its 16-segment peak level meters.

Performance features include closed-loop dual capstan transport, bi-directional auto search, auto space (for cueing), electronic display, and a tape counter that also functions as a real time counter.

The CD491. Don't compare it to any other cassette deck. Compare it to the source you're recording.

[1]Dolby is the registered trademark of Dolby Laboratories, Inc.


ULTRAWIDEBAND LINEAR PHASE CASSETTE DECK
harman/kardon CD 491
PEAK LEVEL METER
LEFT
dB
RIGHT
Dolby NR
HX PRO
B C
EJECT
POWER
DOLBY B-C NR HX PRO
3 HEADS/DIRECT DRIVE/CLOSED LOOP DUAL CAPSTAN
REW AUTO SEARCH
PLAY
FFWD AUTO SEARCH
STOP
RECORD
PAUSE
TAPE COUNTER
reset
time
count
DOLBY B-C NR
NR
type
mpx filter
BIAS/EQUALIZATION
METAL
CrO2
LN
70μsec
120μsec
TIMER
play
off
rec
peak hold
meter weighting
AUTO
memory
rewind
replay
repeat
tape monitor
BIAS FINE TRIM
hi cut
+hi boost
bias tone
rec cal
left
right
MASTER FADER
max
min
REC MUTE
AUTO SPACE
OUTPUT LEVEL
MIC LEVEL
off
LEFT — REC LEVEL — RIGHT
HEADPHONES

Specifications

	CD91	CD191	CD291	CD391	CD491
Tape Speed (i.p.s.):	1⅞	1⅞	1⅞	1⅞	1⅞
Heads:	2	2	2	2	3
Record/Play Head Type	Sendust	Sendust	Sendust	Sendust	Sendust/Ferrite
Frequency Response, −20dB (IHF std) All tape Formulations** Metal:	20Hz-20kHz ±3dB same	20Hz-21kHz ±3dB same	20Hz-21kHz ±3dB same	20Hz-22kHz ±3dB same	20Hz-24kHz ±3dB 20Hz-26kHz ±3dB
Large Signal Response (0dB, with Dolby* on, Metal Tape):	20Hz-12kHz ±3dB	20Hz-15kHz ±3dB	20Hz-20kHz ±3dB	20Hz-20kHz ±3dB	20Hz-20kHz ±3dB
Wow-and-Flutter (NAB, WRMS): (DIN):	0.05% 0.08%	0.05% 0.08%	0.05% 0.08%	0.025% 0.04%	0.025% 0.04%
Signal-to-Noise Ratio (Cr02) Dolby NR*, off: Dolby B*, on: Dolby C*, on:	57dB 65dB –	57dB 65dB 73dB	57dB 65dB 73dB	58dB 66dB 74dB	58dB 66dB 75dB
Total Harmonic Distortion, 1kHz, metal tape, Dolby* level:	0.9%	0.9%	0.9%	0.9%	0.9%
Channel Separation	45dB	45dB	45dB	45dB	45dB
Channel Crosstalk	70dB	70dB	70dB	70dB	70dB
Erase Ratio	65dB	65dB	65dB	65dB	65dB

Reference Tapes: LN-Maxell UD-XLI; Cr02-TDK-SA; Metal-TDK-MA
*Registered Trademark of Dolby Laboratories, Inc.
**No Ferrichrome position on any model

Specifications

	CD91	CD191	CD291	CD391	CD491
Bias Frequency:	105kHz	105kHz	105kHz	105kHz	105kHz
Fast Forward and Rewind Time:	90 Sec (C-60)	90 Sec (C-60)	90 Sec (C-60)	90 Sec (C-60)	90 Sec (C-60)
Peak Reading Meter Range	−20dB to +8dB	−20dB to +8dB	−20dB to +8dB	−30dB to +10dB	−30dB to +10dB
Output Level, 0dB, 10k Ohm load:	380mV	380mV	380mV	420mV (Max)	420mV (Max)
Output Impedance	<5 k Ohms	<5 k Ohms	<5 k Ohms	<5 k Ohms	<5 k Ohms
Input Sensitivity (0dB) MIC: Line:	– 50mV	0.65mV 50mV	0.65mV 50mV	0.65mV 40mV	0.65mV 40mV
Input Impedance MIC: Line:	– 22 k Ohms	1.0 k Ohms 22 k Ohms	1.0 k Ohms 22 k Ohms	1.0 k Ohms 22 k Ohms	1.0 k Ohms 22 k Ohms
Headphone Impedance (Minimum):	8 Ohms	8 Ohms	8 Ohms	8 Ohms	8 Ohms
Dimensions: Height with legs	4 13/16"/122mm	4 13/16"/122mm	4 13/16"/122mm	4 13/16"/122mm	4 13/16"/122mm
Depth with knobs	13½"/343mm	13½"/343mm	13½"/343mm	13½"/343mm	13½"/343mm
Width	17 3/8"/440mm	17 5/16"/440mm	17 5/16"/440mm	17 5/16"/440mm	17 5/16"/440mm
Shipping Weight	16 lbs/7.3 kg	16 lbs/7.3 kg	16 lbs/7.3 kg	17.6 lbs/8 kg	18 lbs/8.2 kg

All features and specifications subject to change without notice

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