

GENELEC®

Genelec S30D
Digital Monitoring System

Operating
Manual



1. General description

The Genelec S30D is a three-way Digital Monitoring System including a digital audio interface, balanced analog audio input, loudspeaker drivers, speaker enclosure, multiple power amplifiers and active, low level crossovers. All these are carefully aligned and housed within the loudspeaker cabinet.

Featuring a 96 kHz/24-bit digital audio interface and a proprietary ribbon tweeter capable of reproducing up to 50 kHz acoustic output, the S30D is a no compromise design. The fast, low distortion amplifiers are capable of driving a stereo system to peak output levels in excess of 122 dB SPL at 1 m with program signals. Versatile crossover controls allow for precise matching of the speaker system to different acoustic conditions. Designed for relatively small control rooms and available in vertical and horizontal versions, this system is ideal for multichannel digital workstations, mastering work, general purpose broadcasting and television studios, post production facilities and mobile recording vehicles. The high output and absolute reproduction accuracy make the S30D an ultimate nearfield monitor in recording studios.

2. Digital audio

The quality of a digital audio signal is defined by two parameters: word length and sampling rate. The word length defines how precisely the audio signal is represented. Studio recording systems use word lengths of 20 bits and above, typically 24 bits. The sampling rate determines what frequencies can be represented in the digital audio signal. A higher sampling rate allows higher frequencies to be recorded.

Converting the digital presentation to an analog signal involves potential sources of error. The digital-to-analog converter may have inferior per-

formance. It may be misaligned with the amplifiers. The interface between the converter and the amplifier may distort the signal or it may change the frequency balance. Genelec S30D solves all of these problems. The alignment of the whole system is carefully balanced to ensure precise monitoring of the digital signal.

3. Integrated construction

As the digital interface and amplifiers are built into the speaker enclosure, the only connections required are the mains supply and the digital (or analog) input signal, making the S30D very easy to set up and use.

The rugged amplifier is mounted into the enclosure with vibration isolators which act also as quick release hinges making possible maintenance operations very easy and straightforward. The speaker cabinet is constructed of veneered MDF, which is heavily braced to eliminate structural resonances.

Digital interface

The digital audio interface consists of a digital audio receiver and a digital-to-analog converter (D/A converter). The digital input accepts an AES/EBU digital audio signal having a word length up to 24 bits. With an impedance adapter, the S30D can also accept SP-DIF signal. Digital thru allows the digital audio signal to be retransmitted to other S30D loudspeakers and digital audio equipment.

Crossover filters

The crossover frequencies of the active crossover network are 420 Hz and 4 kHz. Special calibrated controls are included in the crossover to reach uniform frequency balance in different acoustic conditions. A high pass filter is included in the LF channel to protect the woofer from subsonic signals. Variable level control allows for accurate level matching to the digital or analog signals.

Amplifiers

The bass, midrange and treble amplifiers each produce 120 W of short term power with very low THD and IM distortion. Special attention is paid to electronics design to obtain the best possible subjective sound quality. The output impedance of the woofer amplifier is negative to improve acoustic transient response. Drivers and amplifiers are also protected from thermal overload.

Drivers

The 210 mm (8") woofer is loaded with a 24 liters (0.85 cu.ft.) vented cabinet. The woofer has a very large magnet and a long linear excursion capability. These are needed to reproduce low frequencies with high efficiency and acoustic output (SPL) in a small enclosure. The -3dB point is 35 Hz and the low frequency response extends down to 31 Hz (-6dB).

A carefully designed 80 mm cone driver, sealed in a cast aluminum alloy housing, reproduces the critical midrange frequencies where the ear is the most sensitive. To minimize coloration the diaphragm is specially impregnated. As a result, the midrange driver's response actually extends well beyond the range required by the crossovers.

The high frequency driver is a proprietary ribbon tweeter with a moving mass of only 32 mg and frequency response extending up to 50 kHz. The dispersion characteristics of both the tweeter and midrange driver are matched for constant tonal balance in different rooms.

4. Installation

Every Genelec S30D is delivered with a mains cable and an Operating Manual. Signal cables are not included.

After unpacking, check that the mains voltage selector (see figure 2) is correctly set for your local mains volt-

age, and place the loudspeakers at their listening position, taking note of the reference axis (see figure 1). The reference axis should be aimed directly at the listening position. Ensure that the mains switches are off and connect the mains cables.

How to set up for digital signals

Connect a digital audio interface cable to your digital audio source. You can identify the right connector on your audio source by looking for the words "Digital Output" or "AES/EBU OUT". Make absolutely sure that the connectors are carrying the AES/EBU formatted digital audio signal. **NEVER** connect an analog signal cable to S30D's digital input connector!

Connect the digital signal cable to the "DIGITAL INPUT" female XLR connector on a S30D (see figure 2). Next connect a second signal cable from speaker's "DIGITAL THRU" male XLR connector to the "DIGITAL INPUT" connector of another S30D as shown in Figure 3 below. You can daisy-chain practically any number of S30D's in this manner. Figure 4 overleaf shows an example of a cabling scheme for a digital 5.1 channel console.

Use the "CHANNEL SELECT" switches to select loudspeaker mode. Any S30D in the chain can be designated

to play "Left (A)", "Right (B)" or "Left+Right (A+B)" channel.

Adjust the desired maximum SPL at 1m for a full scale digital signal using the "DIGITAL LEVEL" switches. This compensates for differing amounts of headroom on the digital signal and enables the speaker to work at its maximum SPL if required. The "DIGITAL LEVEL" can be set to 112, 100 or 88 dB SPL at 1m with a full scale sine wave digital signal.

The "LEVEL CONTROL" trimmer adjusts the level of both the digital and analog signals. Use this trimmer to give the digital level an extra 0 to -12 dB attenuation in addition to the "DIGITAL LEVEL" switches. Combining these makes it possible to adjust the maximum SPL at 1m for a full scale sinusoidal digital signal anywhere between 112 dB and 76 dB.

Switch on the mains power and feed an AES/EBU digital signal to the sys-

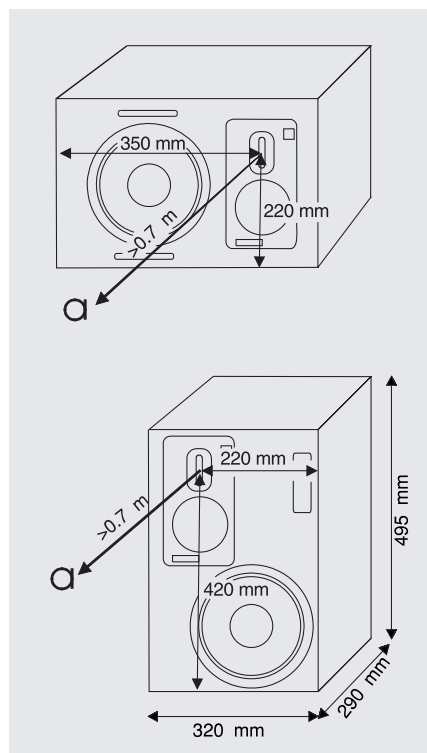


Figure 1: S30D outer dimensions, with the reference axis located at the tweeter axis.

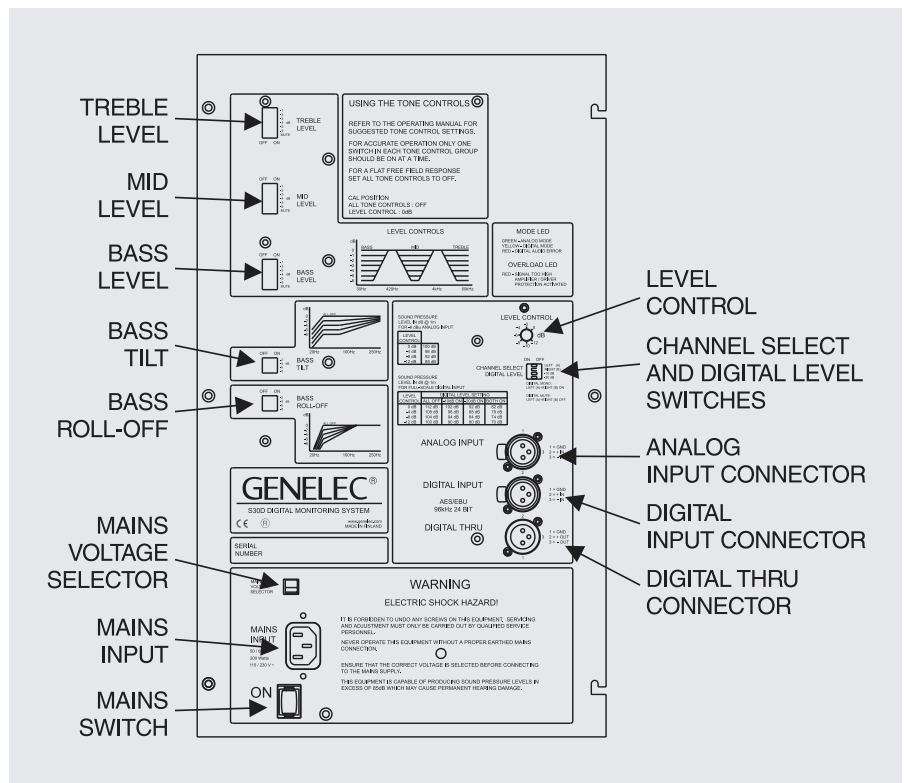


Figure 2: S30D backpanel

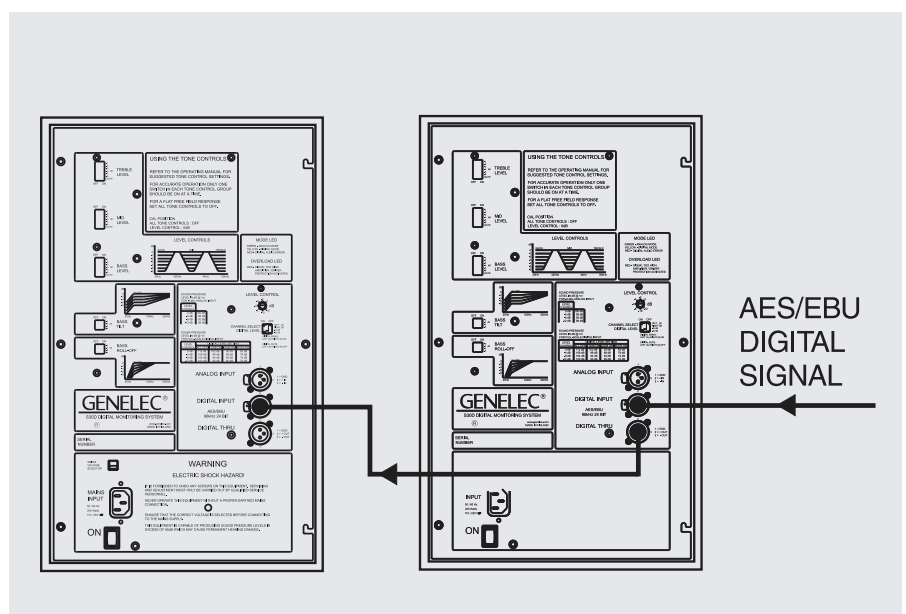


Figure 3: Using the "DIGITAL IN" and "DIGITAL THRU" connectors in a digital setup

tem. When the S30D detects a digital signal it switches automatically to the digital input, and the mode LED turns yellow. The S30D will switch back to the analog input if significant errors are detected in the digital audio or the digital signal is not present. The mode LED indicates this by turning green. If the LED turns red, it indicates an error in the digital signal.

How to set up for analog signals

Turn all mains switches off and remove the digital audio cables. Run balanced XLR cables from your line level analog audio source to the "ANALOG INPUT" XLR connector on each S30D unit.

Switch on the power and observe that the mode indicator LEDs should turn green. The output levels can be adjusted at the "LEVEL CONTROL" trimmer.

Setting tone controls

The response of the system may have to be adjusted to match the acoustic environment. The adjustment is done by setting the tone control switches on the rear panel. The tone controls are in five groups: Treble, Mid and Bass Level, which work in 1 dB steps and Bass Tilt and Bass Roll-Off, which work in 2 dB steps. The factory settings for these are 'ALL OFF' to give a flat anechoic response. See Figure 6 for suggested tone control settings in differing acoustic environments. Figure 7 shows the effect of the controls on the anechoic response. Always start adjustment by setting all switches to "OFF" position. Then set only one switch to "ON" to select the required response curve. To obtain an accurate attenuation value, no more than one switch within a switch group should be set to "ON" at the same time.

5. Monitor placement

Console top mounting

Avoid mounting Genelec S30D monitors directly on the console top. Instead, position the speakers slightly behind the console by using floor stands or wall mounts. This minimizes sound colouring reflections from the console surface.

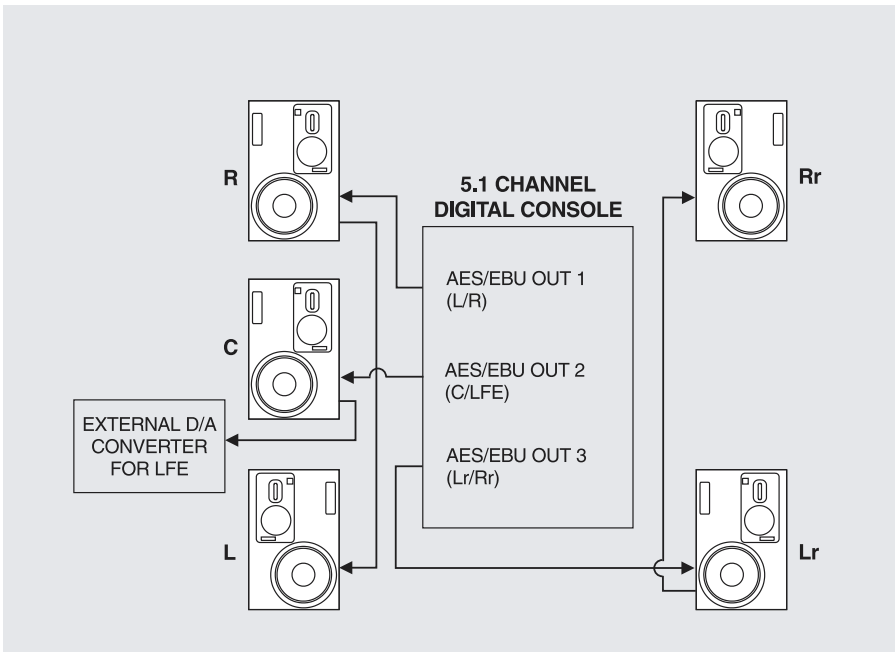


Figure 4. Cabling scheme for a 5.1 channel digital console

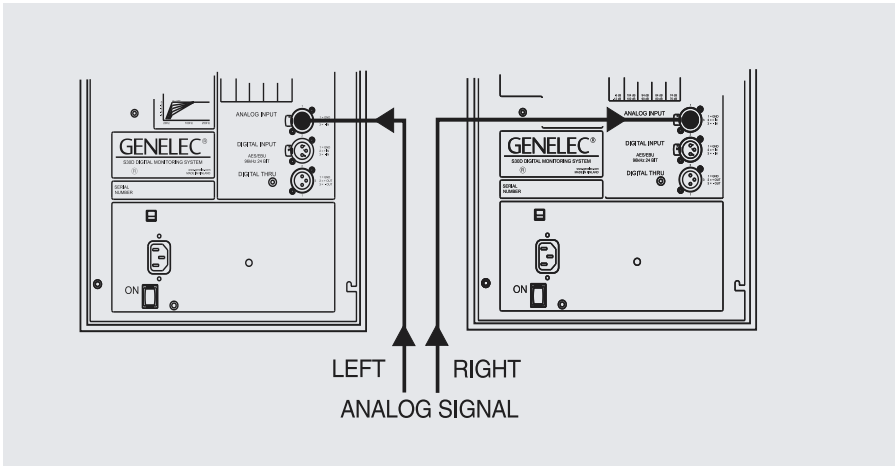


Figure 5. Cabling scheme for analog stereo setup

Speaker Mounting Position	Bass Roll-off	Bass Tilt	Bass Level	Midrange Level	Treble Level
Flat anechoic response	None	None	None	None	None
Free standing in a damped room	None	-2 dB	None	None	None
Free standing in a reverberant room	None	-2 dB	-2 dB	None	None
Soffit mounted in a control room wall	None	None	-4 dB	None	None
In a corner	-2 dB	-2 dB	-2 dB	None	None

Figure 6. Suggested tone control settings for various acoustic environments

Placement in a room

To produce a true and accurate stereo or multichannel image the monitors must have exactly similar frequency responses, and they shall be

located at identical distance from the listener. When placed in a room monitor responses change due to reflections of the sound waves from the room's boundaries. Place the monitors at the same height and also at

the same distance from the front and side walls so that reflections, and therefore changes to the frequency response, are similar. Smaller objects, such as equipment racks also cause reflections and disturb the imaging, so they too should be placed symmetrically in the room.

To avoid differences in low frequency responses due to reflections from the front wall, the monitors should be placed either nearer than 1m or further than 3m from the front wall. Placement close to the front wall (<1m) will boost low frequencies, and the tone controls should be adjusted appropriately (see figure 6).

The monitors should be aimed toward the listening position. This maximizes the ratio of direct sound to reflected sound and the listener is able to hear more of the material and less of the room effects. Subjectively this is perceived as cleaner sound and superior imaging.

6. Maintenance

There are no user serviceable parts in the unit. Maintenance or repair of the

S30D units may only be done by qualified service personnel.

7. Troubleshooting

To help you solve any problems, here are a few pointers:

- Make sure that your audio signal source has been set to transmit the audio to the AES/EBU output.
- Make sure the digital cables are specified for use with AES/EBU digital audio signals and properly connected at both ends.
- Make sure the LED turns yellow as you plug in the digital audio cable to the S30D unit. If this is not the case, go back to your audio source and check once more that the right output is selected. If the LED stays green you do not have a valid digital audio carrier on the cable.
- If you see the LED flashing red colour, check your cabling. Red colour indicates a bit error in transmission.

8. Safety considerations

Genelec S30D has been designed in accordance with international safety standards. To ensure safe operation and to maintain the instrument in safe operating condition, the following warnings and cautions must be observed:

- Servicing and adjustment may only be performed by qualified service personnel.
- Do not use this product with an unearthed mains cable as this may compromise electrical safety.
- This equipment is capable of producing sound pressure levels in excess of 85 dB, which may cause permanent hearing damage.
- Free flow of air behind the loudspeaker is necessary to maintain sufficient cooling. Do not obstruct airflow around the loudspeakers.
- Do not insert any objects through the bass reflex port(s) on the face of the unit, as this may damage the drive units inside the loudspeaker.
- Do not run an analog audio signal to the digital input XLR connector. Doing so may overload your audio equipment output and cause them permanent damage.

9. Guarantee

This product is guaranteed for a period of ONE year against faults in materials or workmanship. Refer to supplier for full sales and guarantee terms.

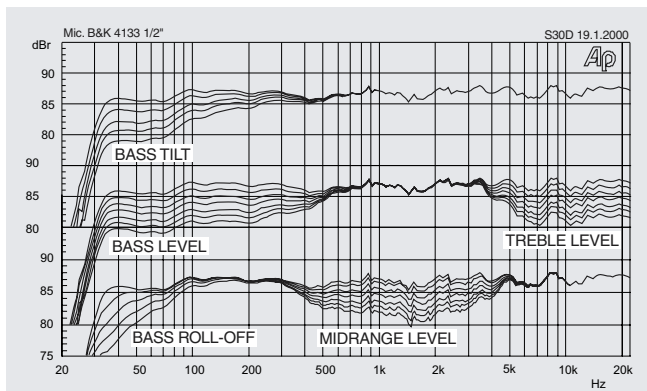


Figure 7. The effect of 'treble tilt', 'bass tilt' and 'bass roll-off' controls in free field.

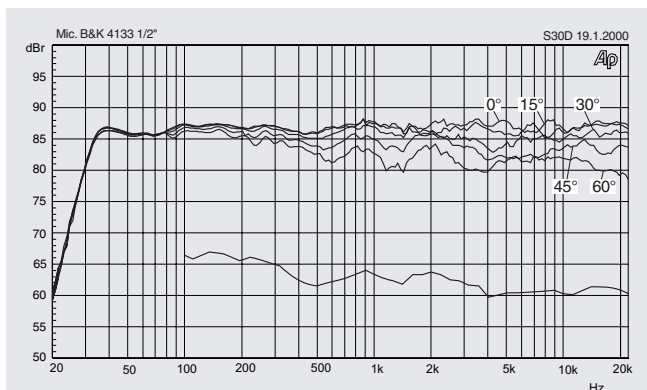


Figure 8. Horizontal directivity characteristics and power response of S30D in its vertical configuration measured at 1m in free field.

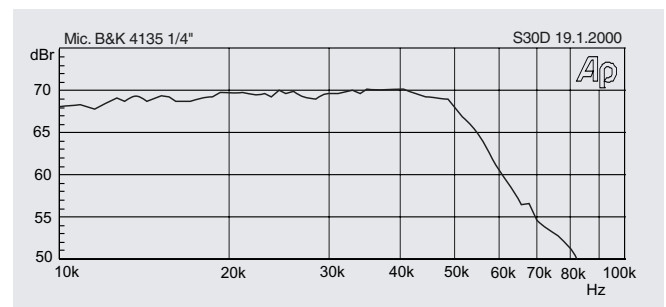


Figure 9. The on-axis free field response of the S30D between 10 and 100 kHz.

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A C T I V E M O N I T O R I N G

SYSTEM SPECIFICATIONS

Lower cut-off frequency, -3 dB:	≤35 Hz
Upper cut-off frequency, -3 dB:	≥50 kHz
Free field frequency response of system:	36 Hz - 48 kHz (±2.5 dB)
Maximum short term sine wave acoustic output on axis in half space, averaged from 100 Hz to 3 kHz:	@1m ≥111 dB SPL @0.5m ≥117 dB SPL
Maximum long term RMS acoustic output in same conditions with IEC-weighted noise (limited by driver unit protection circuit):	@1m ≥102 dB SPL @0.5m ≥108 dB SPL
Maximum peak acoustic output per pair on top of console, @ 1m from the engineer with music material:	≥122 dB
Self generated noise level in free field @ 1m on axis:	≤10 dB (A-weighted)
Harmonic distortion at 90 dB SPL at 1m on axis:	freq. ≤200 Hz <2% freq. >200 Hz <1%
Drivers:	Bass 210 mm cone Midrange 80 mm cone Treble 9x65 mm ribbon
Weight:	20 kg (44 lb)
Dimensions:	Height 495 mm (19 1/2") Width 320 mm (12 5/8") Depth 290 mm (11 7/16")

CROSSOVER SECTION

Analog input connector:	XLR female pin1 gnd pin2 + pin3 -
Input impedance:	10 kOhm
Input level for maximum short term output of 111 dB SPL @1m:	variable from +17 to +5 dBu
Output level for -6 dBu analog input:	variable from 88 to 100 dB SPL@1m
Subsonic filter below 33 Hz :	18 dB/octave
Ultrasonic filter above 60kHz:	12dB/octave
Crossover frequency:	bass/mid 420 Hz mid/treble 4 kHz
Crossover acoustical slopes:	18 - 24 dB/octave
Crossover level control operating range in 1 dB steps:	bass from 0 to -6 dB mid from 0 to -6 dB treble from 0 to -6 dB
Bass roll-off control in 2 dB steps:	from 0 to -8 dB @35 Hz
Bass tilt control in 2 dB steps:	from 0 to -8 dB @80 Hz

The 'CAL' position is with all tone controls set to 'off' and level control to maximum.

OPTIONS

Flight case	OrderCode 1001-401
Wall mount	OrderCode 1010-404-V/H*
Floor stand	OrderCode 1010-405-V/H*
Grille	OrderCode 1010-409

*V=Vertical (for S30D V), H=Horizontal (for S30D H)

DIGITAL SECTION

Digital input :	XLR female
Digital thru output:	XLRmale
Maximum input word length:	24 bits
Input format:	AES/EBU, SP-DIF*
Input termination impedance:	110 Ohms*
Input sampling rate:	29-100 kHz (no de-emphasis) 44.1 kHz (using de-emphasis)
Jitter resilience:	0.15 unit intervals
Dynamic range:	113dB (A weighted, triangular PDF dither, 24 bit data)
De-emphasis:	50/15us, automatic
Recovered clock jitter:	200 picoseconds RMS typical
Output level for full scale digital input:	variable from 76 to 112 dB SPL@1m

* An optional impedance matching adapter is required for 75 Ohm signal source.

AMPLIFIER SECTION

Amplifier output power with an 8 Ohm load (Short term):

Bass	120 W
Midrange	120 W
Treble	120 W

Long term output power is limited by driver unit protection circuitry.

Slew rate: 80V/μs

Amplifier system distortion at nominal output:

THD	≤0.05%
SMPTE-IM	≤0.05%
CCIF-IM	≤0.05%
DIM 100	≤0.05%

Signal to Noise ratio, referred to full output:

Bass	≥100 dB
Midrange	≥100 dB
Treble	≥100 dB

Mains voltage: 100/200V or 115/230V AC

Voltage operating range: nominal ±10%

Power consumption:

Idle	30W
Full output	200W

GENELEC®

Genelec Oy, Olvitie 5
FIN - 74100 IISALMI, FINLAND
Phone: +358 - 17 - 83881
Telefax: +358 - 17 - 812267
Web: <http://www.genelec.com>
E-mail: genelec@genelec.com

Genelec Inc, 7 Tech Circle
Natick, MA 01760, USA
Phone: +1 - 508 - 652 - 0900
Fax: +1 - 508 - 652 - 0909
E-mail: genelec@compuserve.com



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