**DesignWare IP Audio Solutions**

**Portfolio**
- Stereo DACs: Compact/VoIP, Hi-Fi, Enhanced Hi-Fi
- Stereo ADCs: Compact/VoIP, Hi-Fi, Enhanced Hi-Fi
- Stereo Audio Codecs: Compact/VoIP, Hi-Fi, Enhanced Hi-Fi
- Enhanced Hi-Fi
- Digital Audio
- Class-D Amps

**Foundries and Processes**
- Available in major foundries and in the most advanced technology nodes
- Easily ported to any CMOS foundry and process

**Applications**
- Set-top Box
- Car Audio
- Mobile Phones, Handhelds
- Portable Media Players

Demand continues to increase for small consumer systems with higher quality audio capabilities. In addition to increasing audio performance, system developers must constantly innovate to decrease power dissipation and development costs and get their products to market faster than ever before. Synopsys offers the most comprehensive portfolio of high-performance, compact, low-power and easy-to-integrate audio IP on the market.

**Technology Highlights**

**Expertise in audio**
- High-performance (e.g. 97 dB @ < 6mW power consumption)
- Leading provider of Audio IP

**Comprehensive portfolio**
- Ultra compact/enhanced voice/VoIP: +80 dB
- Compact Hi-Fi: +90 dB
- Hi-Fi: +96 dB; enhanced Hi-Fi: +/-103 dB
- Drivers: AB, Class-D and Class-G
- Digital Audio: high linearity PWM digital output

**Application expertise**
- From low-power/compact area for digital microphones to complete Hi-Fi Audio systems
### About DesignWare® IP

Synopsys is the leading provider of high-quality, silicon-proven interface and analog IP solutions for system-on-chip designs. Synopsys' broad IP portfolio delivers complete connectivity IP solutions consisting of controllers, PHY and verification IP for widely used protocols such as USB, PCI Express, DDR, SATA, HDMI and Ethernet. The analog IP family includes Analog-to-Digital Converters, Digital-to-Analog Converters, Audio Codecs, Video Analog Front Ends, RF, Power Management solutions and more. In addition, Synopsys offers SystemC transaction-level models to build virtual platforms for rapid, pre-silicon development of software. With a robust IP development methodology, extensive investment in quality and comprehensive technical support, Synopsys enables designers to accelerate time-to-market and reduce integration risk.

For more information on DesignWare IP, visit [http://www.synopsys.com/designware](http://www.synopsys.com/designware)

<table>
<thead>
<tr>
<th>Application</th>
<th>IP type</th>
<th>Description</th>
<th>Dynamic range</th>
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<tbody>
<tr>
<td>Set top boxes, DVD-R and Blu-ray Disc™, HDTV, car audio</td>
<td>Light CODEC</td>
<td>A to D conversion, D to A conversion, Line input, Line output, Volume control and signal mixing, Linear phase digital filtering, I2S interface, Testability</td>
<td>+80 dB, +90 dB, +96 dB, +103 dB</td>
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<td>MP3 and WMA players, Mobile phones, handheld GPS, DSC and DMC</td>
<td>Advanced CODEC</td>
<td>All of the above + Loudspeaker and headset driving, Microphone boosting and bias, Phantom ground, Clock generation (audio PLL), Automatic level control, Flexible power up/down sequences, And more...</td>
<td>+80 dB, +90 dB, +96 dB, +103 dB</td>
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<tr>
<td>Portable media players, handheld gaming, smartphones</td>
<td>Complete CODEC</td>
<td>All of the above + Sound FX (3D enhancement, etc.), Parametric equalization (up to 10 bands), Enhanced signal mixing, True ground, Jack insertion sensing, SC detection, And more…</td>
<td>+80 dB, +90 dB, +96 dB, +103 dB</td>
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