Highly integrated single-chip amplifier solution with Qualcomm® DDFA™ Digital Amplifier Technology, designed for smaller form factor speakers, portable speakers, and more.

CSRA6640 is a flexible, single-chip solution designed to bring a new level of integration to our patented DDFA amplifier technology. This tight integration makes superior class-D amplification more commercially viable on smaller form factors and cost sensitive products, helping manufacturers to differentiate by supporting premium sound quality in their mid to high-end audio products.

CSRA6640 is designed to offer multiple development advantages for premium audio performance, reduced BOM and reduced complexity of design.

Key benefits of CSRA6640 include:

- Premium amplification engineered for superior audio quality in smaller form factor, lower power speakers
- A new level of integration to help reduce design complexity and optimize BOM. This product includes our patented DDFA technology integrated on a single amplifier chip, including the amplifier output stage.
- Unique, patented DDFA technology - Qualcomm DDFA is designed to optimally balance the power efficiency of Class D devices alongside the high-performance audio output of traditional, linear amplifiers
- A new scalable evaluation kit is available with CSRA6640 which includes the necessary hardware, software, development tools and information needed to help optimize product scoping and design and reduce development time.

### Product Highlights

#### Highly-integrated, single-chip architecture

Digital modulator, feedback processor, microcontroller, memory, configurable DSP, additional features and output phase -- all integrated on a single-chip solution.

#### Superior sounding digital audio

DDFA true digital and patented closed-loop architecture is engineered to provide a solution for designing speakers and amplifiers with low-noise, low-distortion and high dynamic range.

#### Advanced DSP features

The advanced configurable DSP with high-resolution support, automatic sample rate conversion, and mixing and filtering capabilities can help manufacturers build high-quality devices without the need for additional, external components.

#### Renowned DDFA technology

DDFA has been associated with high-end audio devices for more than ten years and is used by industry leading brands in the audio market today. As a result, DDFA technology and branding is recognised as a sign of excellent sound quality among audio-enthusiasts and consumers.
Features

Highly integrated single-chip architecture:
- DDFA Digital PWM modulator
- Analogue feedback processor
- Integrated microcontroller and OTP Memory
- Power management unit with single input power supply
- 2x20W BTL or 1x40W PBTL output stage
- Thermal protection

High-resolution configurable DSP:
- 8 channels, 2 channels out, with integrated audio mixer
- Up to 384kHz PCM and TDM inputs, as well as DSD64/128
- Automatic sample rate detection and conversion
- Bass and treble crossovers and tone control
- 15 biquad filters per channels
- Choice of interpolation filters with different sound characters
- Independent volume controls
- Delay lines for driver alignment
- Dynamic compression and soft clipping management

Flexible PWM configuration:
- 400KHz and 800KHz modulation
- AD and BD modulation options

Additional features:
- Cascade mode with four CSRA6640 combined for up to eight channels output sharing a single TMD bus and crystal
- Serial control interface over SPI/I²C
- Tuning tools for PCs
- GPIO resources

CSRA6640 Applications

- Portable Speakers
- Networked Audio Products
- Speakers
- Headphone Amplifiers
- Soundbars
- Hifi Amplifiers

CSRA6640 Block Diagram

CSRA6640 Specifications*

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>THD+N</td>
<td>&lt; 0.0025% (8 Ohms, AD 400Khz modulation, 1kHz, -1d BFS)</td>
</tr>
<tr>
<td>Signal-to-Noise Ratio</td>
<td>&gt;112dB (AD 400kHz modulation, A-wt, 1kHz, 0d BFS)</td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>&gt; 112dB (AD modulation, A-wt, 1kHz, 0d BFS)</td>
</tr>
<tr>
<td>Noise Floor Modulation</td>
<td>&lt; 2dB (-60dBFS to -1dBFS)</td>
</tr>
<tr>
<td>Residual Noise</td>
<td>&lt; 35μVrms (AD modulation)</td>
</tr>
<tr>
<td>Package Size</td>
<td>9mm x 9mm x 0.9mm, 0.4mm pitch, 76-pin QFN</td>
</tr>
</tbody>
</table>

* These specifications are based on typical performances, and may vary based on your design.

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