



White paper

# Audio converter based on Trident Microsystems USB Audio Codec

## **RT-RK Computer Based Systems LLC**

Narodnog Fronta 23a  
21000 Novi Sad  
Serbia

phone: +381 (0)21 4801 100  
fax: +381 (0)21 450 721  
e-mail: [info@rt-rk.com](mailto:info@rt-rk.com)  
[www.rt-rk.com](http://www.rt-rk.com)

## Customer

The Customer is a global leader in development and production of military systems. Their products are used across the globe in various defense technologies.

## Project overview

The goal of the project was to design prototypes, develop, fabricate, and test versatile printed circuit boards based on Trident Microsystems USB Audio Codec.

The cards comprised several interfaces:

- USB 2.0 communication channel
- PC-Audio interface
- Speaker interface
- Push-to-Talk Foot interface

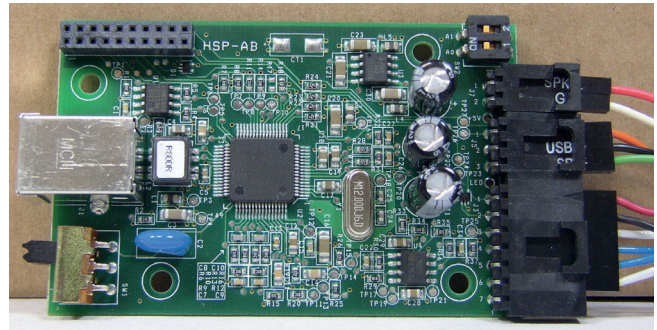
The interfaces implemented the following key functions:

- Conversion of digital audio signals from a CPU in the USB format to analog audio, and vice versa
- Audio amplification
- Audio interface for isolation of inputs/outputs induced by the transformers
- CPU interface to GPIO in USB (HID support)
- Control of the input/output audio levels by the CPU, via USB interface

The high requirements regarding performance were:

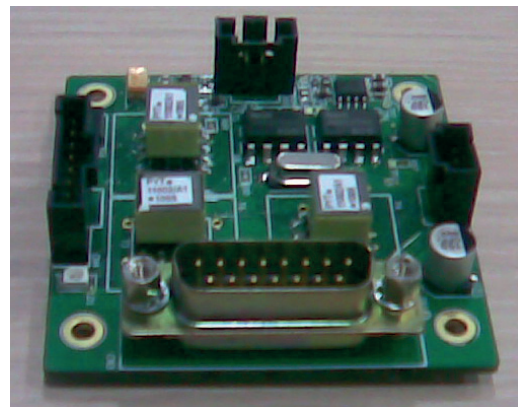
- Achieve low total harmonic distortion (below 0.5%)
- Good signal-to-noise ratio, dynamic range (beyond 80 dB)
- Fair channels separation (beyond 90 dB)
- Wide volume control range (beyond 30 dB)
- Variable and programmable gain amplification in 1dB/step

The main challenges of the project were requirements coming from the military standards. The cards had to satisfy reliability specifications, i.e. needed to have a minimum predicted MTBF of 200,000 hours, along with less than 30 minutes MTTR and 120 minutes TTR.



*One version of the audio board*

The cards had to be produced with high cost efficiency and satisfy strict terms of work in extreme environmental conditions. Special care is taken to provide a good working performance in a low and high temperature range. The cards needed to survive impacts of shock, vibration, and to work in an environment with a high level of humidity. Numerous EMC/EMI requirements were also satisfied.



*One version of the audio board*

In order to meet such a wide range of requirements, special test benches were developed and produced. Several quality assurance procedures were established and conducted, such as Performance Qualifications Test, Environmental Qualifications Test, Quality Acceptance Test, and Environmental Stress Screening.

## Benefits

The project covered development from the product idea, concept proving, to building prototypes and small series production (several thousands per year). The complete development, production, testing process, and costs were transparent to the Customer via regular meetings, appropriate reports, and on-site inspections.

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