Timberwolf Digital Signal Processor family, powered by *AcuEdge*™ Technology

Designed for IP Speakerphones

ZL38040

Product Brief

Document ID# 147016 Version 6 October 2014

Description

The ZL38040 is part of Microsemi's new Timberwolf audio processor family of products that features the company's innovative *AcuEdge* acoustic technology, which is a set of highly-complex and integrated algorithms. These algorithms are incorporated into a powerful DSP platform that allow the user to extract intelligible information from the audio environment from which they are communicating.

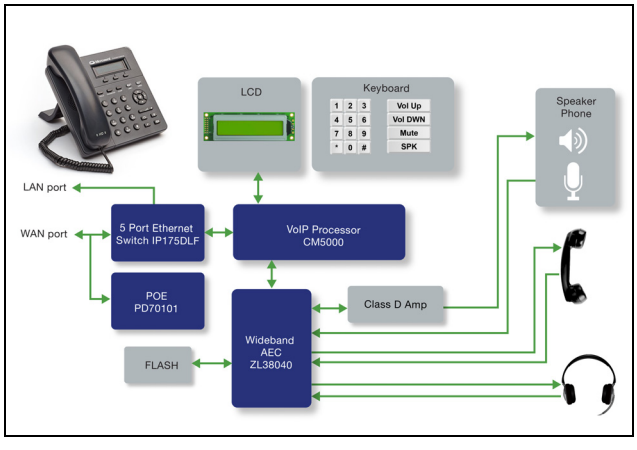
The Microsemi *AcuEdge* Technology ZL38040 is designed to provide advanced Acoustic Echo Cancellation (AEC) and Noise Reduction (NR) for speakerphone and conference applications.

The Microsemi *AcuEdge* Technology license-free, royalty-free intelligent audio Firmware provides AEC, NR and a variety of other voice enhancements to improve both the intelligibility and subjective quality of voice in harsh acoustic environments.

The *MiTuner*™ Automatic Tuning Kit and ZLS38508 *MiTuner* GUI provide automatic tuning and easy control for manual fine tuning adjustments. Further, the ZLS38508 *MiTuner* GUI provides easy graphical control of the various interconnections required to meet the needs of your application.

Applications

- Full duplex Speakerphone for digital telephones
- Echo cancellation for video conferences



Typical IP Speakerphone Application

Ordering Information

Device OPN	Package	Packing
ZL38040LDF1	64-pin QFN (9x9)	Tape & Reel
ZL38040LDG1	64-pin QFN (9x9)	Tray

These packages meet RoHS 2 Directive 2011/65/EU of the European Council to minimize the environmental impact of electrical equipment.

Microsemi *AcuEdge* Technology ZLS38040 Firmware

- Wideband and Narrowband Acoustic Echo Cancellation (for up to 3 microphones)
- Full or Half duplex operation, supports long tail AEC (up to 256 ms) in both Narrowband and Wideband operation
- G.168 Line Echo Canceller
- Non-linear echo cancellation provides higher tolerance for speaker distortions
  - Advanced NR reduces background noise from the near-end speech signal using Psychoacoustic techniques
- Keypad scanner (up to a 7x7 array)
- Signal mixing
  - 44.1/48 kHz stereo music playback with 8 kHz/16 kHz voice
- Howling detection/cancellation
  - Prevents oscillation in AEC audio path
- Continuous double talk convergence
- Comfort noise generation
- Telephone signal detection and generation
  - Programmable tone generation (DTMF)
  - DTMF receiver
  - Caller ID Type 1 & 2 detection
  - Call Progress tone detection
- Various encoding/decoding options:
  - 16-bit 2's complement (linear)
  - G.722, G.711 A/μ law
- Send and receive path equalizers
  - 16-band for Narrowband mode
  - 22-band for Wideband mode
- 44.1/48 kHz bypass mode
- Configurable Cross-Point Switch

ZL38040 Hardware Features

- DSP with Voice Hardware Accelerators
- Dual ΔΣ DACs with output sampling up to 48 kHz and internal output drivers
  - 4 single-ended or 2 differential Output Amps
- 2 Digital Microphone inputs supporting up to 3 Microphones
- 2 TDM ports shared between PCM and Inter-IC Sound (I^2S)
  - Each port provides sample rate conversion and synchronous and asynchronous TDM bus operation
- SPI Slave port for host processor interface
- Master SPI port for serial Flash interface
- 14 General Purpose Input/Output (GPIO) pins
- General purpose UART port
- Boots from SPI, UART, or Flash allowing easy firmware updates
  - Can run unattended (controllerless), self-booting into a configured operational state
- Crystal-less operation (with a valid TDM clock)
- 16-bit digital-to-analog converter (DAC)
  - Headphone amps capable of 4 single-ended or 2 differential outputs
  - 32 mW output drive power into 16 ohms
  - Impulse pop/click protection
- Ultra-low and Standby off power

Performance

- AEC Tail Length: 256 ms
- AEC sampling rate: 8 and 16 kHz
- Single Talk TCLw: > 60 dB
- Double Talk TCLw: > 40 dB
- Double Talk Attenuation: < 3 dB
- Noise reduction up to 30 dB

The *MiTuner*™ Automatic Tuning Kit and ZLS38508 MiTuner GUI

Microsemi's *MiTuner* kit provides hardware, software and support for the automatic tuning of Microsemi's *AcuEdge* Technology audio processors.

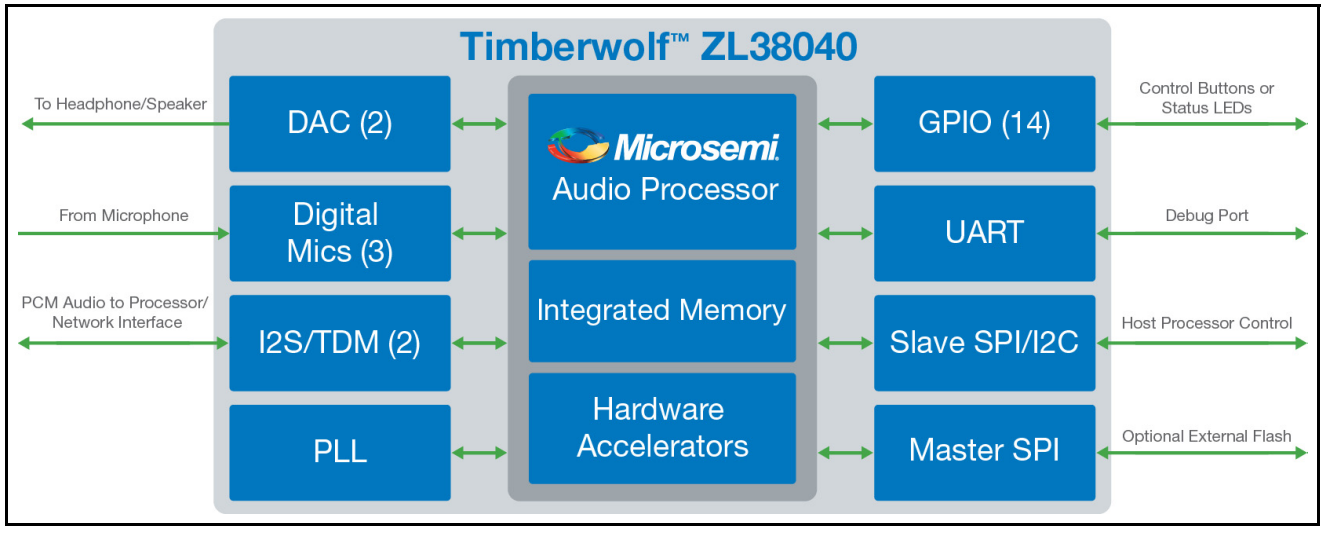
Features include:

- Auto tuner allows user to automatically tune key parameters of the system
- Visual representation of the audio paths allow variations in the audio routing configuration
- Visual representation of the key building blocks in the transmit (Tx) and receive (Rx) audio paths with drop-down menus to program block parameters
- Set the analog and digital gains
- Configure parameters allows users to “fine tune” the performance

Tools

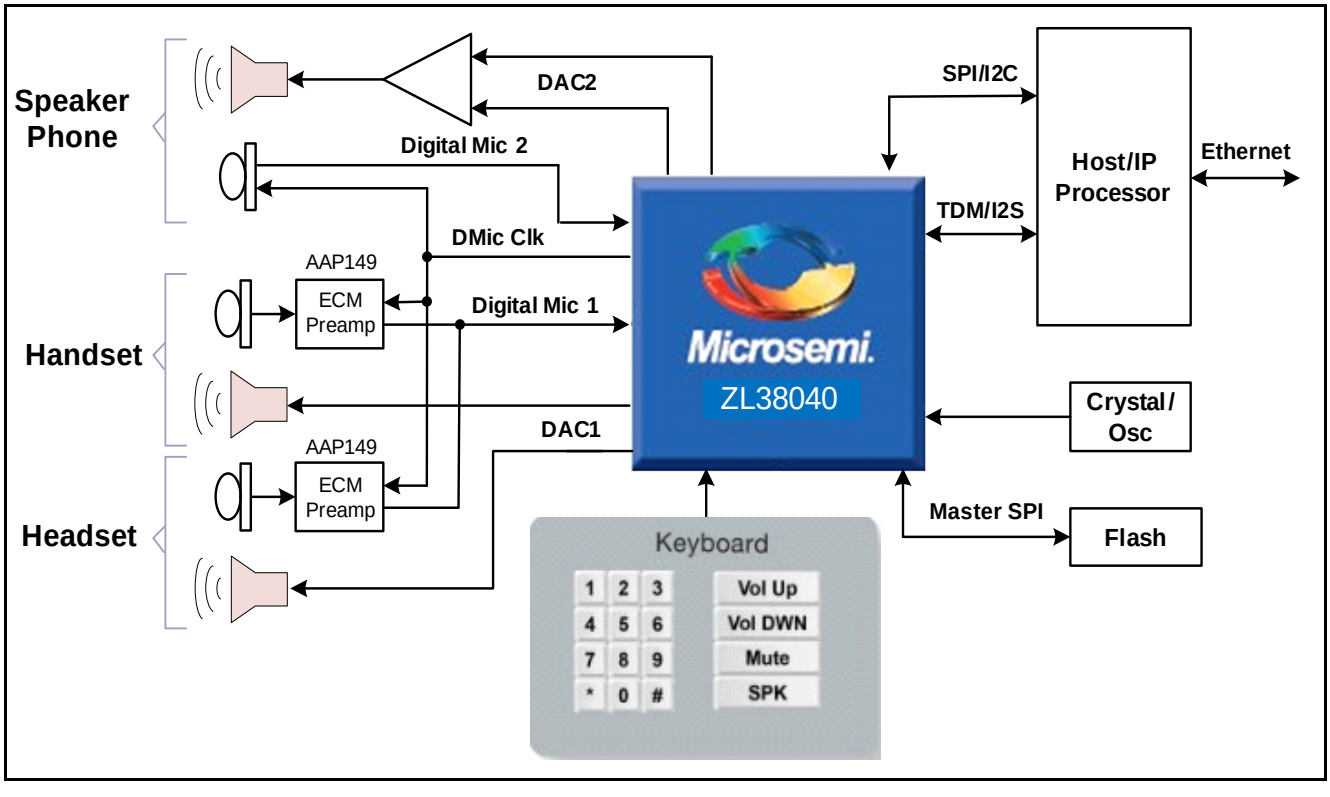
- ZLE38040 Evaluation Kit
- *MiTuner*™ Automatic Tuning Kit
- ZLS38508 *MiTuner*™ GUI

Device Block Diagram



ZL38040 Audio Processor for IP Phones

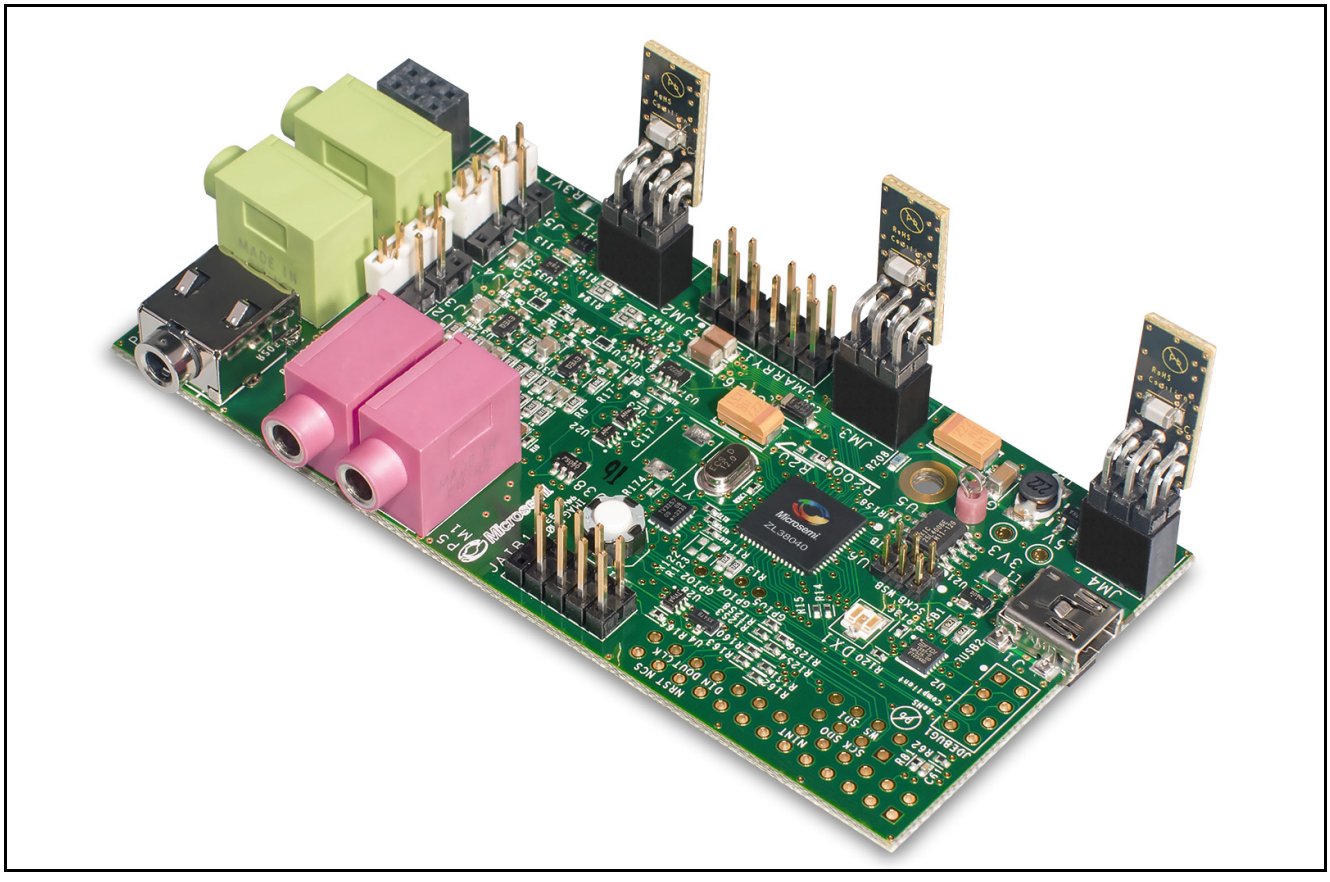
Typical Application Block Diagram



Wideband Telepresence Unit

ZLE38040 Evaluation Kit

The ZLE38040 Evaluation Board is designed to aid and speed up the evaluation of the Microsemi *AcuEdge*™ Technology ZL38040 Audio Processor for IP Phones with the Microsemi *AcuEdge* Technology ZLS38040 Firmware. It provides a simple analog interface that can be connected to microphones and speakers in a plastic enclosure to allow for subjective testing of the Acoustic Echo Canceller. The miniature size allows for easy mounting in an existing plastic enclosure. Easy access to all analog and digital interfaces is provided.

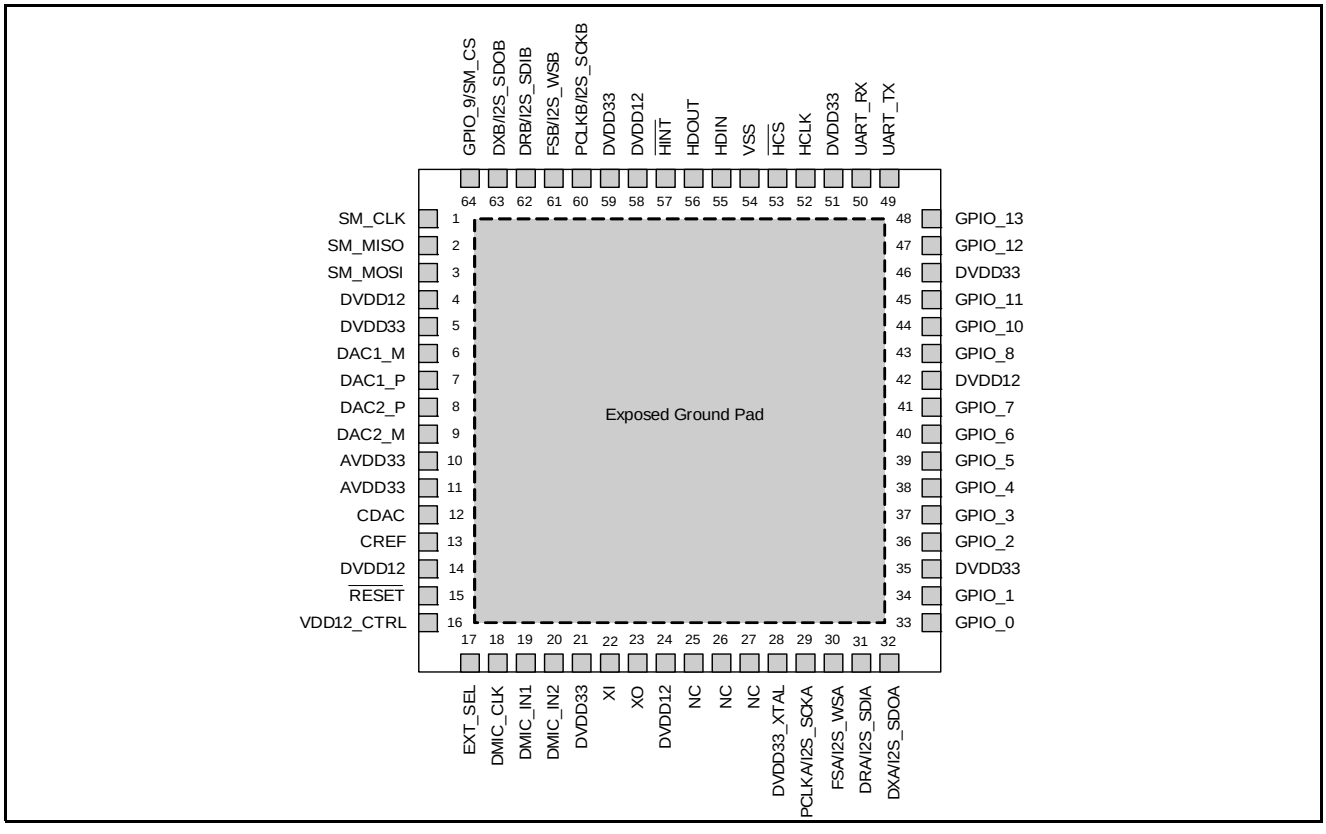


ZLE38040 Evaluation Board

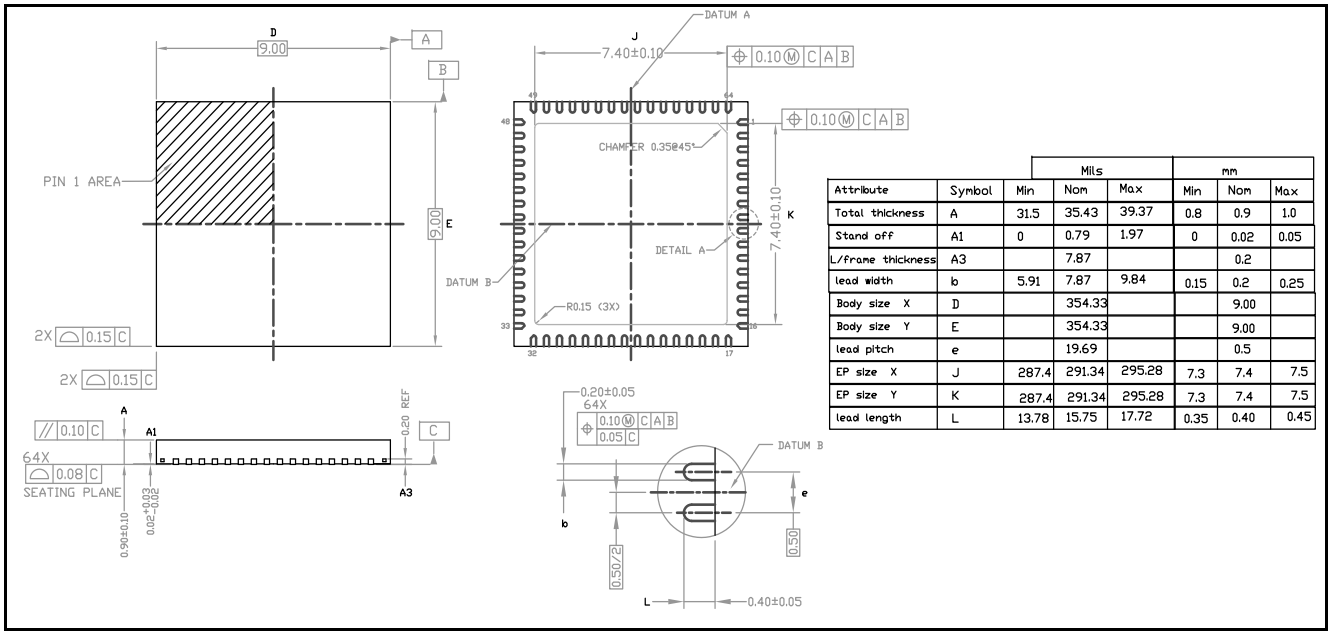
The Evaluation Kit (OPN ZLE38040BADA) is a fully contained design consisting of the ZLE38040 Evaluation Board with USB cable, headset with extension cable, and a speaker.

The ZLE38040 Evaluation Board is controlled using the Microsemi *MiTuner*™ GUI Software (ZLS38508). The *MiTuner* GUI Software can also be used with the optional Microsemi Audio Interface Box (AIB) Evaluation Kit (OPN ZLE38470BADA) to auto tune the ZLE38040 Evaluation Board.

Device Pinout - Top View



Package Outline (64-Pin QFN)



		Mils			mm		
Attribute	Symbol	Min	Nom	Max	Min	Nom	Max
Total thickness	A	31.5	35.43	39.37	0.8	0.9	1.0
Stand off	A1	0	0.79	1.97	0	0.02	0.05
L/frame thickness	A3		7.87			0.2	
lead width	b	5.91	7.87	9.84	0.15	0.2	0.25
Body size X	D		354.33			9.00	
Body size Y	E		354.33			9.00	
lead pitch	e		19.69			0.5	
EP size X	J	287.4	291.34	295.28	7.3	7.4	7.5
EP size Y	K	287.4	291.34	295.28	7.3	7.4	7.5
lead length	L	13.78	15.75	17.72	0.35	0.40	0.45

For more information about all Microsemi products visit our website at www.microsemi.com

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