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

Designed for the Hands-Free Automotive market

ZL38080

Product Brief

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Description

The ZL38080 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 ZL38080 is designed to provide leading edge Acoustic Echo Cancellation and Noise Reduction for the Hands-Free Automotive market.

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 such as high wind noise, engine and road noise.

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

- Hands-Free Phone and Audio capability for Automotive applications

Ordering Information

Device OPN	Package	Packing
ZL38080LDF1	64-pin QFN (9x9)	Tape & Reel
ZL38080LDG1	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 ZLS38080 Firmware

- Wideband and Narrowband Acoustic Echo Cancellation (AEC)
- Full or Half duplex operation, supports long tail AEC (up to 256 ms) in both Narrowband and Wideband operation
- Non-linear echo cancellation provides higher tolerance for speaker distortions
- Advanced Noise Reduction (NR) reduces background noise from the near-end speech signal using Psychoacoustic techniques
- G.169 Automatic Level Control (ALC)
- Automatic Gain Control (AGC)
- Provisions for stereo audio mixing (sample rate of 44.1 or 48 kHz) and stereo music record and playback (sample rate of 48 kHz) with 16 kHz voice processing
- Howling detection/cancellation
  - Prevents oscillation in AEC audio path
- Dynamic Range Compression
- Continuous double talk convergence
- Comfort noise generation
- Long Silence detection
- Mute function
- Programmable tone generation (DTMF)
- 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

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ZL38080 Hardware Features

- DSP with Voice Hardware Accelerators
- Dual ΔΣ 16-bit digital-to-analog converters (DAC)
  - Sampling up to 48 kHz and internal output drivers
  - Headphone amps capable of 4 single-ended or 2 differential outputs
  - 32 mW output drive power into 16 ohms
  - Impulse pop/click protection
- 1 Digital Microphone input supporting up to 2 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)
- Ultra-low power and Reset operation mode 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

- ZLE38080 Evaluation Kit
- *MiTuner*™ Automatic Tuning Kit
- ZLS38508 *MiTuner*™ GUI

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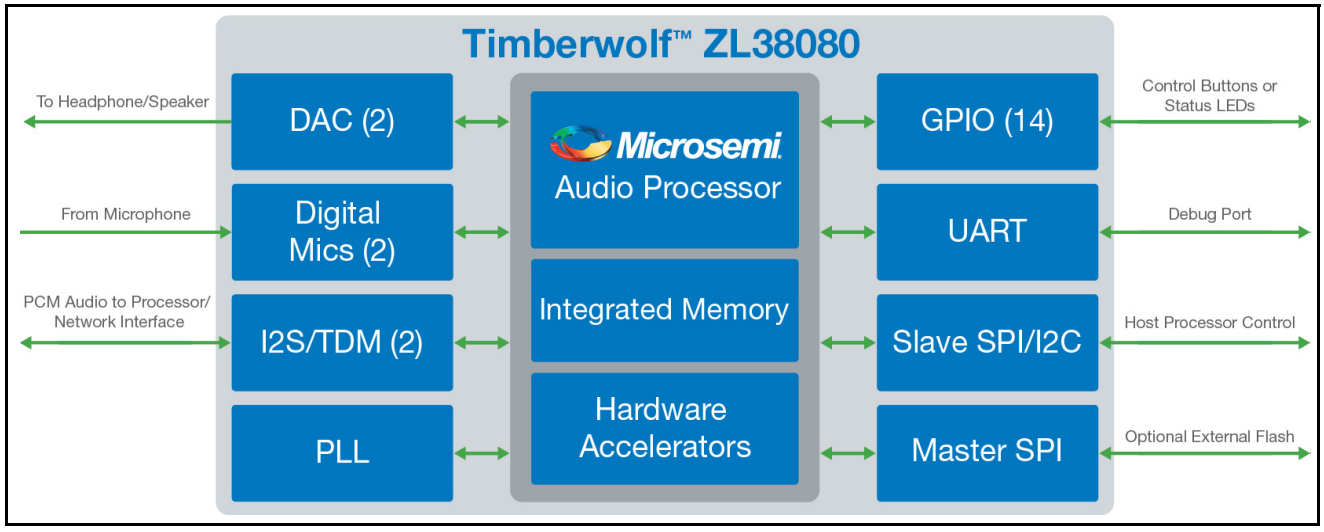
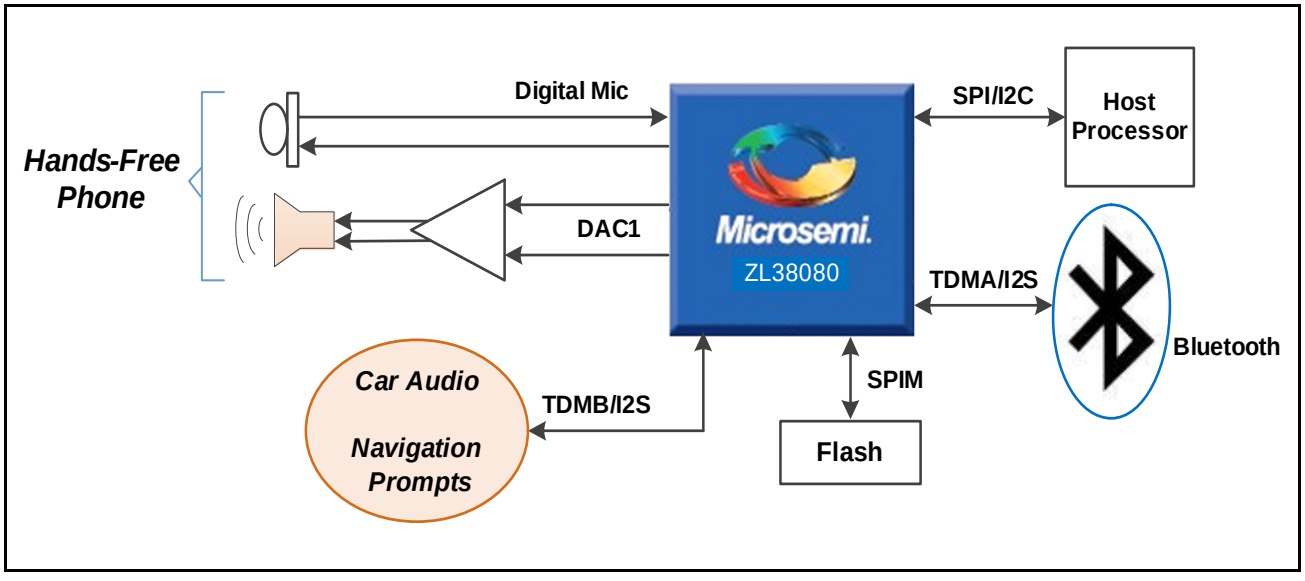
Device Block Diagram



ZL38080 Hands-Free Automotive Audio Processor

Typical Application Block Diagram



Hands-Free Automotive

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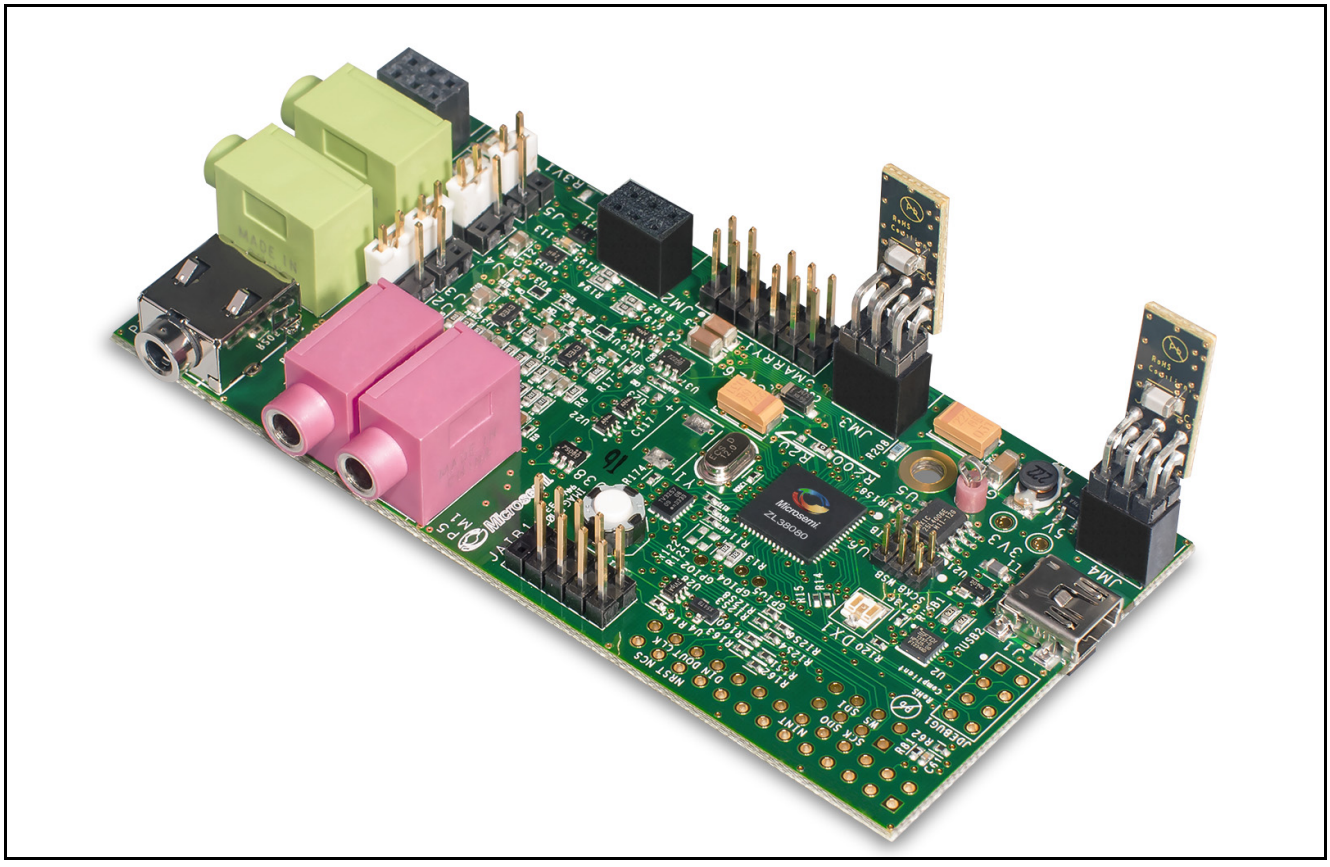
ZLE38080 Evaluation Kit

The ZLE38080 Evaluation Board is designed to aid and speed up the evaluation of the Microsemi *AcuEdge*™ Technology ZL38080 Hands-Free Automotive Audio Processor with the Microsemi *AcuEdge* Technology ZLS38080 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.



ZLE38080 Evaluation Board

The Evaluation Kit (OPN ZLE38080BADA) is a fully contained design consisting of the ZLE38080 Evaluation Board with USB cable, headset with extension cable, and a speaker.

The ZLE38080 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 ZLE38080 Evaluation Board.

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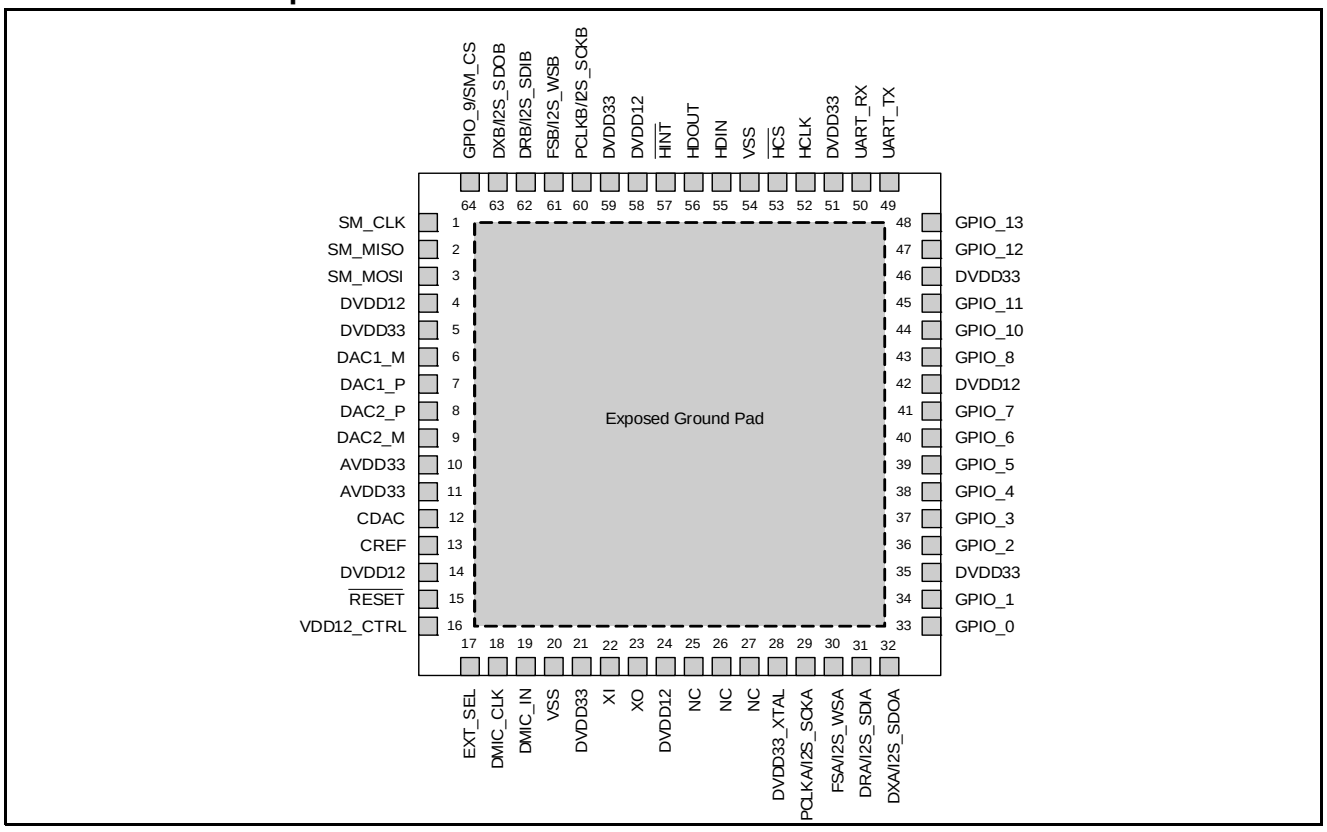
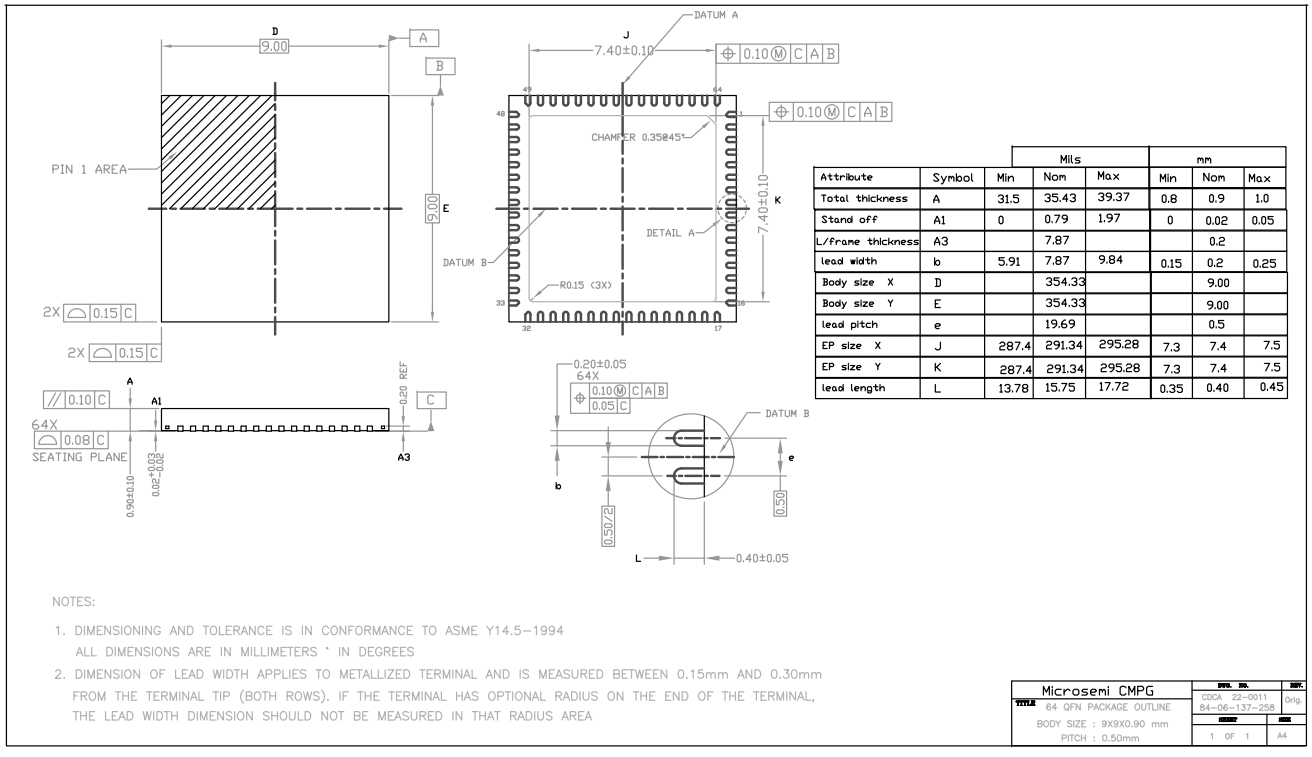
Device Pinout – Top View



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

NOTES:

1. DIMENSIONING AND TOLERANCE IS IN CONFORMANCE TO ASME Y14.5–1994
   ALL DIMENSIONS ARE IN MILLIMETERS ° IN DEGREES
2. DIMENSION OF LEAD WIDTH APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.15mm AND 0.30mm FROM THE TERMINAL TIP (BOTH ROWS). IF THE TERMINAL HAS OPTIONAL RADIUS ON THE END OF THE TERMINAL, THE LEAD WIDTH DIMENSION SHOULD NOT BE MEASURED IN THAT RADIUS AREA

Microsemi CMPG
TITLE 64 QFN PACKAGE OUTLINE
BODY SIZE : 9X9X0.90 mm
PITCH : 0.50mm
DWG. NO. CDCA 22-0011 84-06-137-258
REV. Orig.
SHEET 1 OF 1
SIZE A4

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