DBM10 AI/ML SoC with DSP and Neural Network Accelerator

Overview

The DBM10 is a cost-effective, low-power, small-form-factor, artificial intelligence (AI) and machine learning (ML) dual-core system-on-chip SoC based on a digital signal processor (DSP) and a neural network (NN) accelerator. Optimized for voice and sensor processing, it is suitable for battery-operated devices such as smartphones, tablets, and smart home devices such as remote controls, as well as wearables and hearables—including true wireless stereo (TWS) headsets. The DBM10 can enable AI/ML, voice, and sensor fusion functions that include voice trigger (VT), voice authentication (VA), voice command (VC), noise reduction (NR), acoustic echo cancellation (AEC), sound event detection (SED), proximity and gesture detection, sensor data processing, and equalization.

The DBM10's nNetLite NN accelerator provides the SoC its ML capability. nNetLite is a standalone hardware engine that is designed to accelerate the execution of NN inferences. It is optimized for efficiency to ensure ultra-low power consumption for small- to medium-size NNs. Its cross-platform toolchain supports all commonly used AI/ML training frameworks to simplify model migration, optimization, and deployment.

The DBM10 comes with embedded memory, as well as serial and audio interfaces for communication with other devices in the system, such as an application processor (AP), codecs, microphones, and sensors.

Highlights

- Ultra-low-power, low-cost AI/ML DSP for voice and sensors
- On-board nNetLite neural network (NN) hardware accelerator
- Multiple power modes for optimum power-performance balance
- Rich set of interfaces
- Small form factor, suitable for mobile and wearable devices
- On-board power management
- Self-contained operation, with a simple interface to the AP
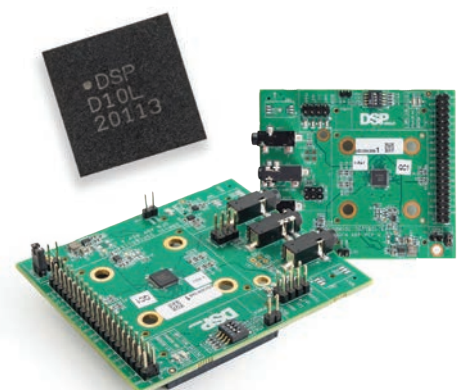- Comprehensive software framework

Benefits

- Enables high-performance, ultra-low-power AI/ML audio/voice/sensor processing in small-form-factor designs
- Comprehensive software framework for fast time-to-market
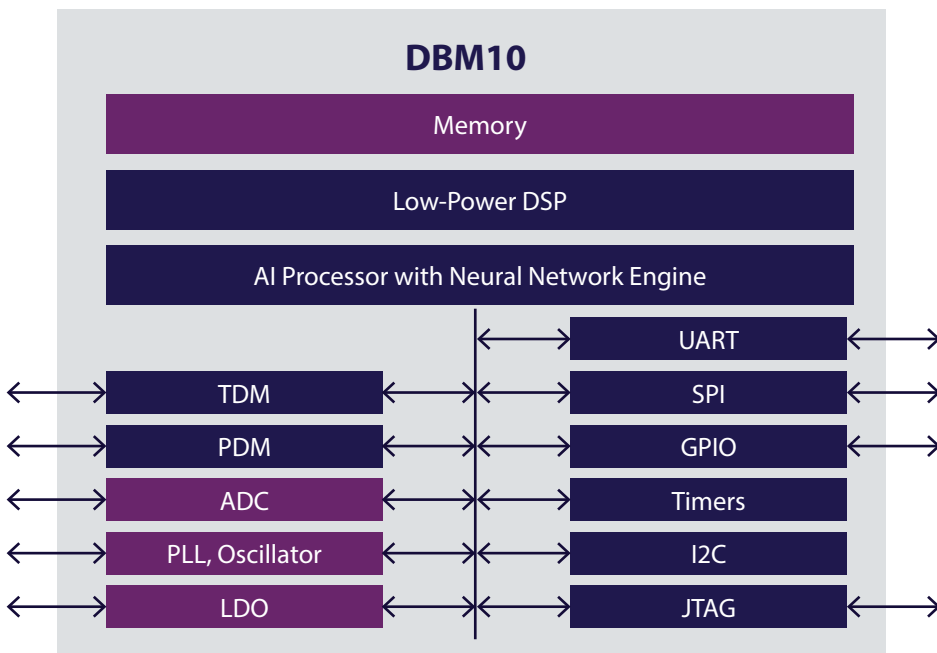
DBM10
Open Audio/ Voice/ Sensor DSP Platform

Features

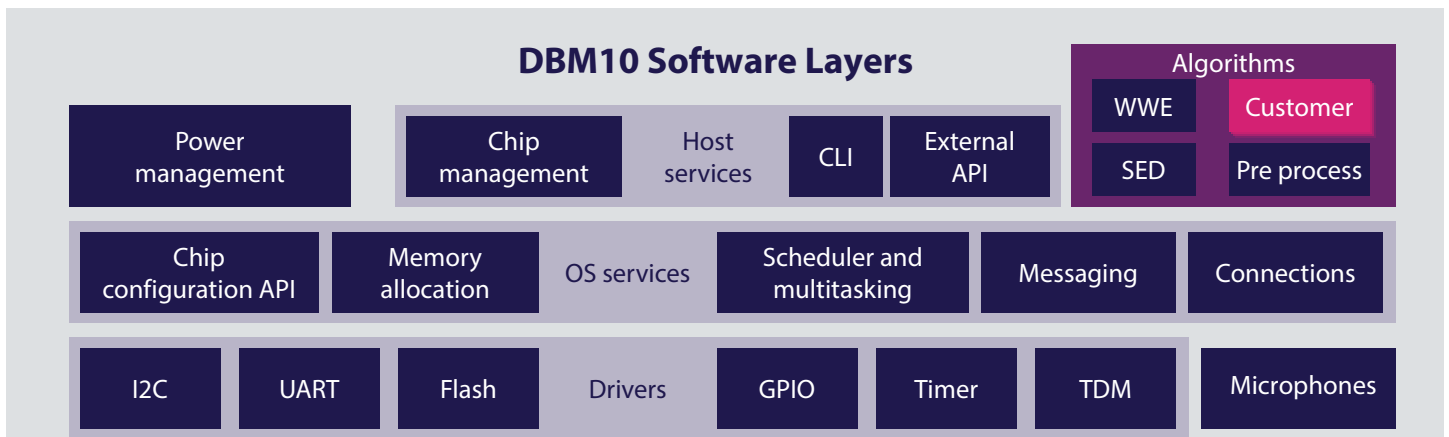|	
Two serial interfaces: SPI and high-speed I2C	32-bit timers; watchdog timer
UART	Interfaces for digital microphone inputs
TDM interface	Low-power ADCs for analog microphones
PDM interface	JTAG-based debug port
GPIOs	Package • 30-ball WLCSP • 48-pin QFN

Software Framework

- Comprehensive software framework
- Real-time operating system
- Drivers for all processor peripherals
- Stand-alone master or slave mode, with external master mode option

- "Internal host" for on-chip system management and communication with external master processor
- Easy connection with external processor running Linux OS
- Linux/Android driver interface
- Dynamic power management capability

DBM10 Software Layers

Algorithms	
WWE	Customer
SED	Pre process

Power management	Chip management	Host services	CLI	External API

Chip configuration API	Memory allocation	OS services	Scheduler and multitasking	Messaging	Connections

I2C	UART	Flash	Drivers	GPIO	Timer	TDM	Microphones

SED = Sound Event Detection; WWE = Wake Word Engine

- ■ SW components provided by DSP Group
- ■ Algorithm domain
- ■ Customer algorithm

DSP Group®, Inc. (NASDAQ: DSPG) is a global leader in wireless communications and voice processing chipsets and algorithms for a wide range of smart-enabled devices. The company was founded in 1987 on the principles of experience, insight, and continuous advancement. We seek to consistently deliver next-generation solutions in the areas of voice, audio, video, and data connectivity. Building upon our core competencies in the area of voice processing, DSP Group invests heavily in innovation for the smart future. The result is leading-edge semiconductor and product development technology that allows our customers to develop products that enhance the end-user experience. From AI-enabled TWS headsets to the voice-enabled smart home. From IoT, security, mobile handsets, tablets, and laptops, all the way to full enterprise-level unified communications (UC) across cloud-based voice services, DSP Group applies its core engineering and technical support capabilities to help its customers meet the demands of an ever-expanding universe of voice-enabled, connected, smart devices.