

УДК 681.2

PROTOTYPE PLATFORM OMAP L-138 (CPU/DSP) FOR IMAGE ACQUISITION

Wawrzyniuk B., Sutkowski M.

*Institute of Microelectronics and Optoelectronics, Warsaw University of Technology
Warsaw, Poland*

The very beginning of the present paper describes a test platform OMAP-L138, developed by Texas Instruments that includes a heterogenic system composed of 2 basic units: ARM and DSP, which will be set up on a Logic PD board. The following chapter discusses the contents of the kit that includes the software of the device, highlighting specific files and explaining the overall construction of the operating system, together with its main components, that allow us to process multimedia data. Then it will be described how to prepare and compile the software in such a way that it met the design brief. At the end two examples of how to use the board to test its scope will be presented. One of them is to show how the system deals with calculations and operations on files in diverse configurations (with ARM, DSP and both) and its use to pro-

cess video data downloaded from a network camera.

Signal processors are widely used in applications for real-time image acquisition, processing and analysis [1, 2, 3]. DSPs (Digital Signal Processors) are designed for very effective digital data processing. Image understand as a two-dimensional function can be also an input data for DSP to perform even very complicated calculations. A dual-processor configuration (ARM + DSP) implementation for image processing is highly motivated due to the possibility of assign required tasks and operations for selected unit to make a whole system much more effective and to work in real-time regime. In this paper we present a platform with heterogenic processor configuration which can be applied for real-time image processing.

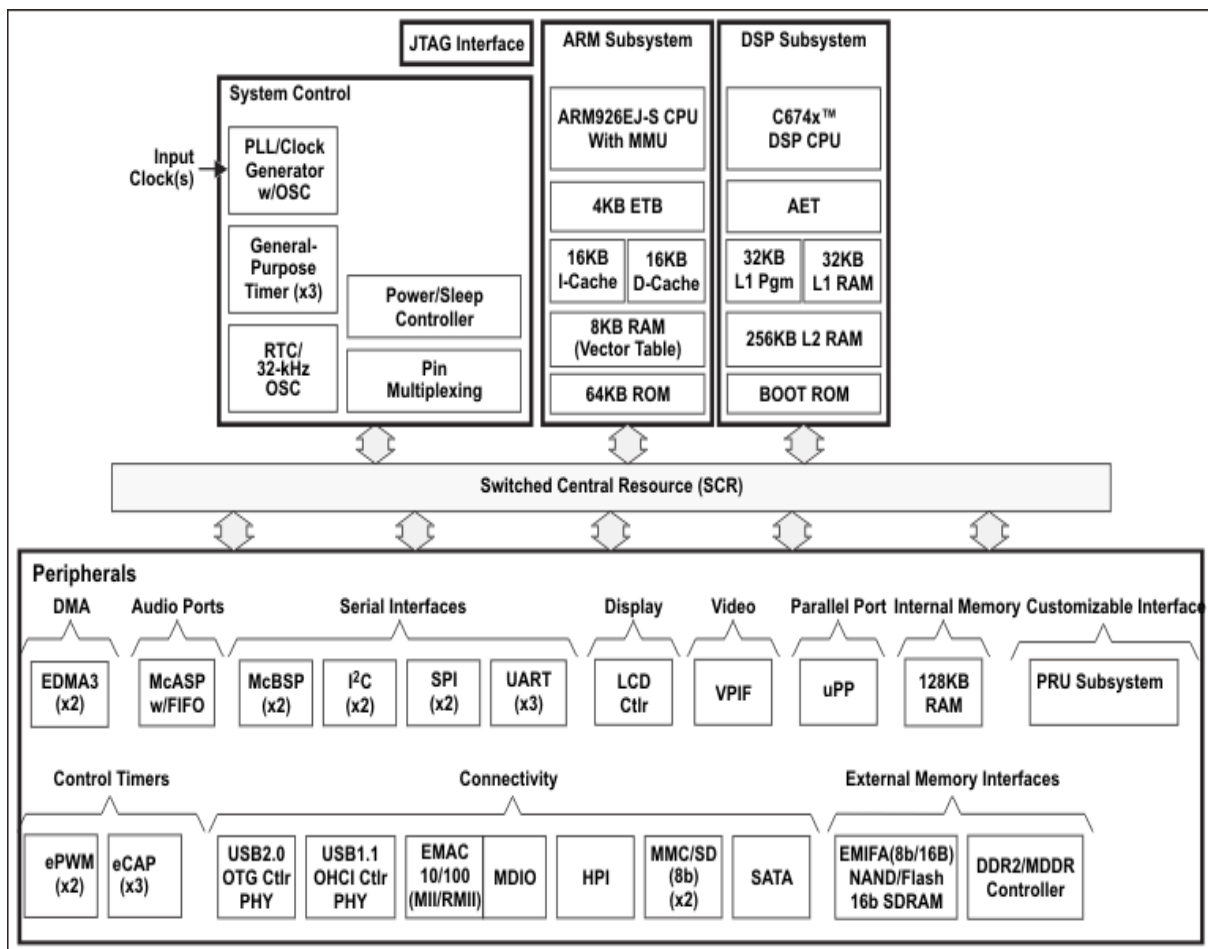


Figure 1 – A functional block diagram of the OMAP-L138

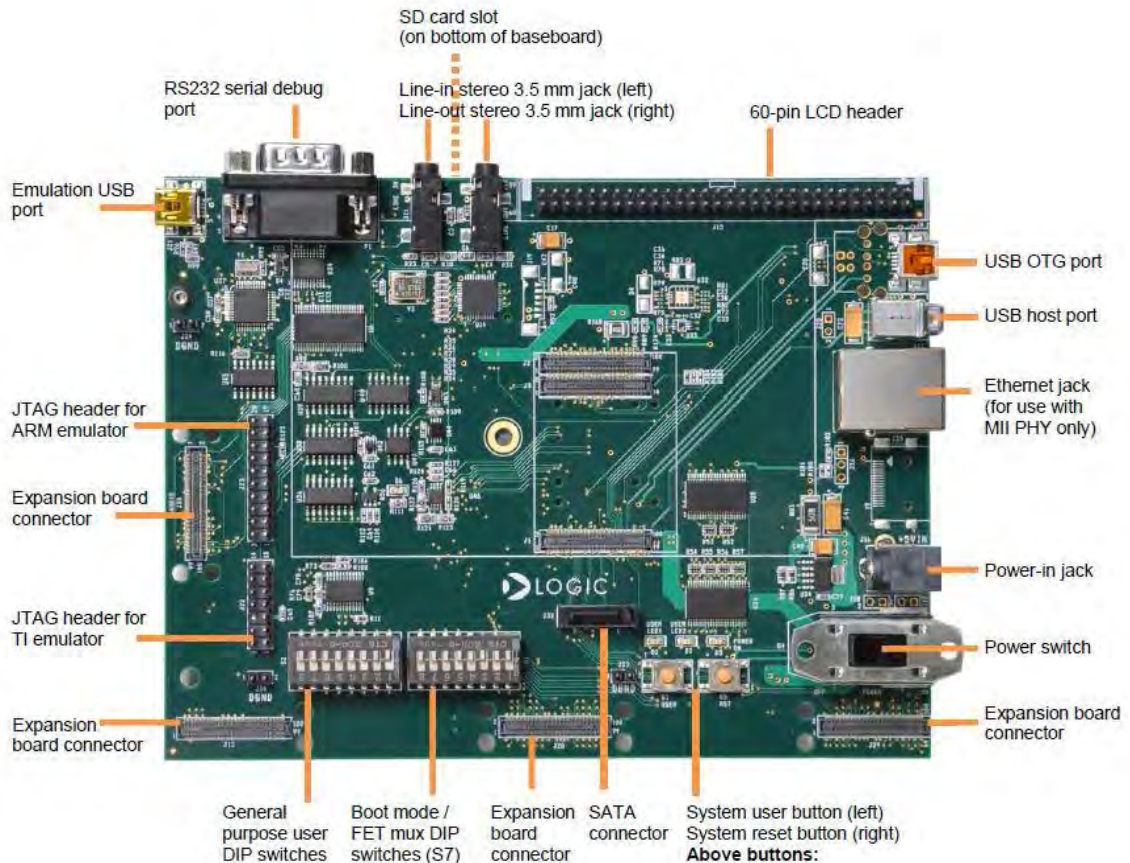


Figure 2 – Mainboard designed for OMAP L-138 and its components

Prototype platform with OMAP L-138. OMAP-L138 is a System-on-Chip (SOC) created by Texas Instruments combining 2 families of processors: ARM (ARM926EJ-S) and DSP (TI C6748). The first of these is based on widely known ARM architecture that is supposed to process data and tasks assigned by the operating system. It is a General Purpose Processor (GGP) with a base clock of 300 MHz. The other one is a DSP processor, a signal processor used for specialized tasks, such as processing streams of video, audio or even specialized arithmetic and logic calculations. When controlled by an operating system, it acts as a coprocessor. The system also includes elements such as programmable real-time unit (PRU), which main task is to support simple applications, assembly patches or even to control frequencies of ARM and DSP cores. The system has also various types of controllers, such as screen controller, SATA, Bluetooth, Wi-Fi, USB, serial communication controllers, real time clock, PWM, and others. All of this is included in the LOGIC PD board and, together with the operation memory, forms a system on module (SOM). The block structure of the OMAP L-138 is shown on Figure 1. The system is supported by a larger board on which the SOM system has been implemented to take full

advantage of the OMAP-L138. It is equipped with peripherals and various connectors, which make it possible to extend the system adding to it additional boards and components.

The main connectors installed on the board are: power connector, RJ45 (Ethernet), USB emulation port (communication through the FTDI system), 2 USB ports to be used by the system, an RS232 serial port, a SATA connector, a 60-pin port for an LCD display and an SD card slot. The arrangement of the most important connectors and ports on the board is shown on Figure 2.

The device's primary communication method uses port RS232, which allow to communicate with the board even without an operating system. This is the low-level method which does not require any software in order to communicate with a user and allow to modify and to upload data to the device's internal memory. However all the operation, communication, control and making a source-codes of the applications has to be done by the external PC unit with Linux operating system – called as "host", the prototype platform equipped with working operating system and proper dedicated software can work as a standalone unit.