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CES-EDU5728

Product Manual

DSP+ARM Embedded Teaching Experiment Platform

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Introduction

CES-EDU5278 DSP + ARM embedded teaching experiment platform is a high-performance, fully-featured experimental system designed by our company based on TI's heterogeneous multi-core (dual ARM Cortex-A15 1.5GHz, dual floating point DSP66xTM) AM5278 processor. Two floating-point C66x long instruction digital signal processors which support 32 16 * 16 bit fixed-point multiply operations per cycle, compatible with C67x and C64x target coding, with powerful image processing capabilities, rich industrial unit, two PRU-ICSS programmable real-time processing and industrial communication unit, each unit consists of two Cortex-M4 coprocessor, support for EtherCAT, EtherNet / IP, PROFIBUS, POWERLINK and other industrial protocols. Experimental motherboard is designed with CAN, I2C, UART, USB, Audio, PCIe, SATA and other practical circuits, which can fully learn and master the hardware principles of heterogeneous multicore systems and system software, and to meet the second innovation experiments and research projects.

Features

- ◆ Based on TI's AM5278 processor, two ARM Cortex-A15 cores / 1.5GHz, two digital signal processor DSPs C66x subsystem / 750MHz
- ◆ Multi-core heterogeneous processor with integrated dual-core ARM Cortex-A15, floating-point dual-core C66x DSP, dual-core Cortex-M4 IPU, dual-core GPU unit
- ◆ Integration of advanced GUI SGX5443 and GC320 2-D graphic accelerator, support 2D / 3D image video

- ◆ With rich industrial application interfaces: 2*PCIe communication buses, 2*Gigabit Ethernet, CAN BUS, RS485, SATA, USB2.0, USB3.0, MCASP, ICSS industrial communication subsystem
- ◆ 10.1-inch capacitive touch display unit with resolution of 1280 * 800px
- ◆ Extended 4G (Full Netcom), WiFi, GPS, Camera and other modules
- ◆ With rich experiment courseware, experiment tutorial, project example, detailed code + complete annotation
- ◆ Adapt to college experiment teaching, research projects, business training, professional and technical competitions

Hardware Parameters











CPU	TI AM5728, dual ARM Cortex-A15 1.5GHz, dual floating point DSP C66x 750MHz, dual Cortex_M4 coprocessor
RAM	1GB DDRIII
eMMC	16GB eMMC
3D Acceleration	ARM Mali-400 MP Core (Quad Fragment processors)
PMIC	Integrated PMIC power management circuit on the core board to achieve embedded intelligent power management, low power consumption
SOC Interface Socket	Panasonic's 0.5mm chip socket, stable and reliable, the overall height significantly reduced, leads to 320 functional pins including Ethernet, SATA, PCIe, RS485, CAN, I2C bus, I2S bus, SPI bus, 16-bit address / Data bus, USB, HDMI, UART, LCD and other signal pins
EEPROM	2*256Kb CMOS EEPROM, I2C interface
RTC Circuit	1*RTC circuit , with round lithium battery (3V) on motherboard
JTAG Debugging	20pin JTAG Debugging interface
Button	1*Power button, 1*system reset button, 5 *user-defined keys
LED	4*LED lights
Ethernet	2*Gigabit Ethernet, standard RJ45 port
Audio	One group of audio circuit and power amplifier circuits, microphone input, headphone audio output, stereo left and right channels output, two speakers, IIS signal, comes from Wolf WM8960GEFL

HDMI	1*HDMI1.4 HD output port, support for video, audio output
Start Mode	One group of DIP switch, support SD card, eMMC, UART, SATA boot mode
CAN	1* Industrial CANBUS Interface
SD	1*SD card slot
RGB LCD	1* 24-bit RGB display interface
LVDS	1*30pin LVDS interface, standard 10.1 inch LCD screen, LED backlight, resolution 1280 * 800, with capacitive touch, multi-touch support, I2C interface
VGA	1 *standard VGA output interface, supports a variety of VGA LCD display
Camera	CMOS interface, support 8 million pixel camera OV5640
Video Input	Reserve two channels of video inputs, using TVP5151 chip
Serial	2*three-wire serial port, two 5-wire serial port, 1* industrial RS485 serial port, COM3 for debugging serial port
USB OTG	1*USB OTG2.0
Full-featured Keyboard	Experimental board configured with a full-featured keyboard
WIFI+BT Combo Module	RTL8723, support for 802.11b / g / n standard
4G	MINI PCIe, SIM card slot, support for 4G communication module, to achieve full Netcom, fast Internet access, send and receive text messages, etc.
G-Sensor	MMA8653FCR1 , I2C , ±2g to±16g
GPS	ATGM336H, serial port, tracking sensitivity of -165dBm, capture -148dBm
USB HOST	4x USB HOST2.0, 1x USB HOST3.0, support a variety of USB devices (such as keyboards, mice, etc.)
SATA	1*eSATA , 1*mSATA
Extended Interface	1*180pin 0.8mm pitch expansion socket, the signal includes 12V power supply, 3.3V power supply, 5V power supply, 20* GPIO, 3* timer, 8-bit MMC, 1* I2C, a group of DMA
Power	DC JACK power supply seat, 12V / 5A DC power supply, with power switch and indicator

Software Parameters

ARM Operating System	Linux4.4.19 、 TI-RTOS、 RT-Linux-4.4.19
DSP Software	TI-RTOS
GPU Development Tools	QT
ARM and DPS Communication Component	IPC
Software Package	SDK Linux、 SDK RT-Linux、 SDK TI-RTOS
Network port module	Gigabit adaptive network port driver, support for Ethernet functions, provide source code
HDMI	Support HDMI output, both images and sound, provide the source code
Audio	I2S communication protocol, support for audio playback, provide the source code
LCD	10.1-inch capacitive touch LCD screen
TOUCH	I2S communication protocol, multi-point capacitive touch, provide the source code
VGA	The default resolution of 1024 * 768, provide the source code
I2C	Provide touch screen, EEPROM, G-Sensor I2C driver
SATA	Support SATA hard disk read and write, provide SATA driver
PCIe	Provide PCIe communication driver
USB HOST	Support HOST3.0 / 2.0, mouse, keyboard, U disk, provide source code
USB OTG	Support ADB and UMS function, provide source code
Keypad	Support 5 *GPIO button function, provide the source code
SD/MMC	Support high-speed SD / MMC card, the software max support 32GB, provide source code
UART	5*UART port, support debugging and communication serial port functions
RTC	Support real-time clock function
G3D	3D graphic acceleration (Mali-400MP)

Product Configuration List

	User CD		Power adapter
	Experimental tutorial		SD card (optional)
	Serial line		Touch pen
	LAN cable		Camera
	USB cable		4G module

Service Support

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Disclaimer

This manual information is for reference only, and is subject to change without notice.

For more product information, please visit www.nrisc.com

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