Hi3518E Demo Board
User Guide

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About This document

Purpose

This document describes the functions, hardware features, hardware configurations, and software debugging method of the Hi3518E demo board.

Related Versions

The following table lists the product versions related to this document.

Product Name	Version
Hi3518E	V100

Intended Audience

This document is intended for:

- Technical support engineers
- Hardware development engineers

Change History

Changes between document issues are cumulative. Therefore, the latest document issue contains all changes made in previous issues.

Issue 00B01 (2014-02-28)

This issue is the first draft release.

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1 Overview

1.1 Introduction

The Hi3518E demo board is a demonstration board developed based on the Hi3518E media processor (the Hi3518E for short) launched by HiSilicon. The demo board provides superior multimedia processing functions, various peripheral interfaces, and hardware reference design based on the Hi3518E. These features enable you to complete hardware development by modifying only module circuits on the demo board.

The Hi3518E demo board can serve as a basic development system by connecting to a PC through UART ports and interface cables. It can also function as a more complete development system or demonstration environment by connecting to the following devices or components:

- TV set or monitor
- Sensor board
- Audio capture device and sound box
- USB 2.0 device
- RealView-ICE simulator
- Storage devices such as the USB flash drive and the secure digital (SD) card

NOTE

HiSilicon provides comprehensive Hi-Boot program, namely, universal boot loader (U-Boot). By using it, you can perform software debugging in TFTP mode without simulators.

1.2 Features

The Hi3518E demo board has the following features:

- Provides a video capture interface to capture raw data. The maximum bit width is 12 bits, and the maximum interface frequency is 74.25 MHz.
- Supports one high-definition multimedia interface (HDMI) output.
- Provides one RJ45 network interface in 10/100 Mbit/s full-duplex or half-duplex mode, and supports energy efficient Ethernet (EEE).
- Provides one high-speed USB 2.0 host port.
- Provides two RS485 interfaces and one RS232 serial port that supports the baud rate of 1200–115200 bit/s.

- Provides one infrared (IR) interface.
- Supports the SD card.

Table 1-1 describes the parameters of the memory supported by the Hi3518E demo board.

Table 1-1 Memory supported by the Hi3518E demo board

Memory	Bit Width	Frequency	Capacity
SPI NOR flash	1-, 2-, or 4-bit	None	16 MB

1.3 Deliverable List

The Hi3518E demo board deliverables include:

- One Hi3518E core board called Hi3518EDMEB
- One Hi3518 peripheral board called Hi3518PERB
- One power adapter with the specifications of 100–240 V AC input, 50 Hz; 12 V DC output, 2 A
- One OV9712 sensor board

The Hi3518E core board and peripheral board are connected through connectors.

Note: The Hi3518 peripheral boards that work with the Hi3518E, Hi3518A, and Hi3518C core boards are the same. For the Hi3518E, change the 1.5 V power for the DDRs on the peripheral board to the 1.8 V power.

1.4 Related Components

The following components are required for program debugging. They are not provided in the deliverable packages. You must get them ready.

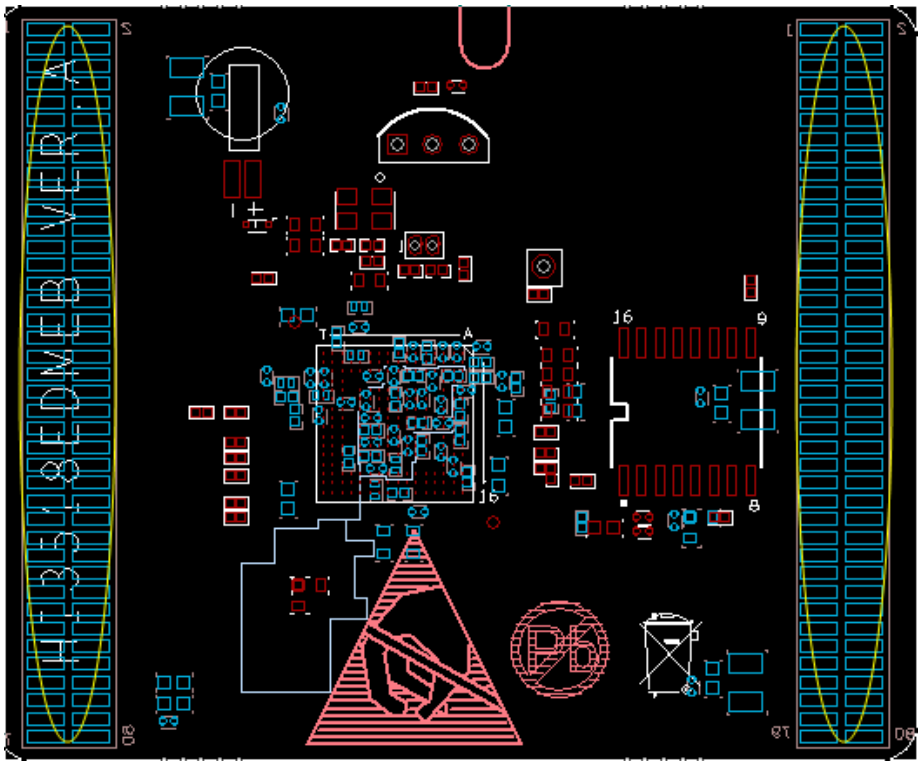
- Network cables
- Audio/Video receiving devices such as the TV set, stereo equipment, and camera
- Serial port cables

2 Hardware Descriptions

2.1 Architecture and Interfaces

Figure 2-1 shows the interfaces on the Hi3518E core board. The connectors in the yellow ellipses are used to connect the Hi3518E core board to the peripheral board.

Figure 2-1 Interfaces on the Hi3518E core board



The Hi3518 peripheral boards that work with the Hi3518E, Hi3518A, and Hi3518C core boards are the same. When the Hi3518E core board works with the Hi3518 peripheral board, change the 1.5 V power on the peripheral board to the 1.8 V power. Figure 2-2 shows the peripheral interfaces on the Hi3518 peripheral board.

Figure 2-2 Peripheral interfaces on the Hi3518 peripheral board

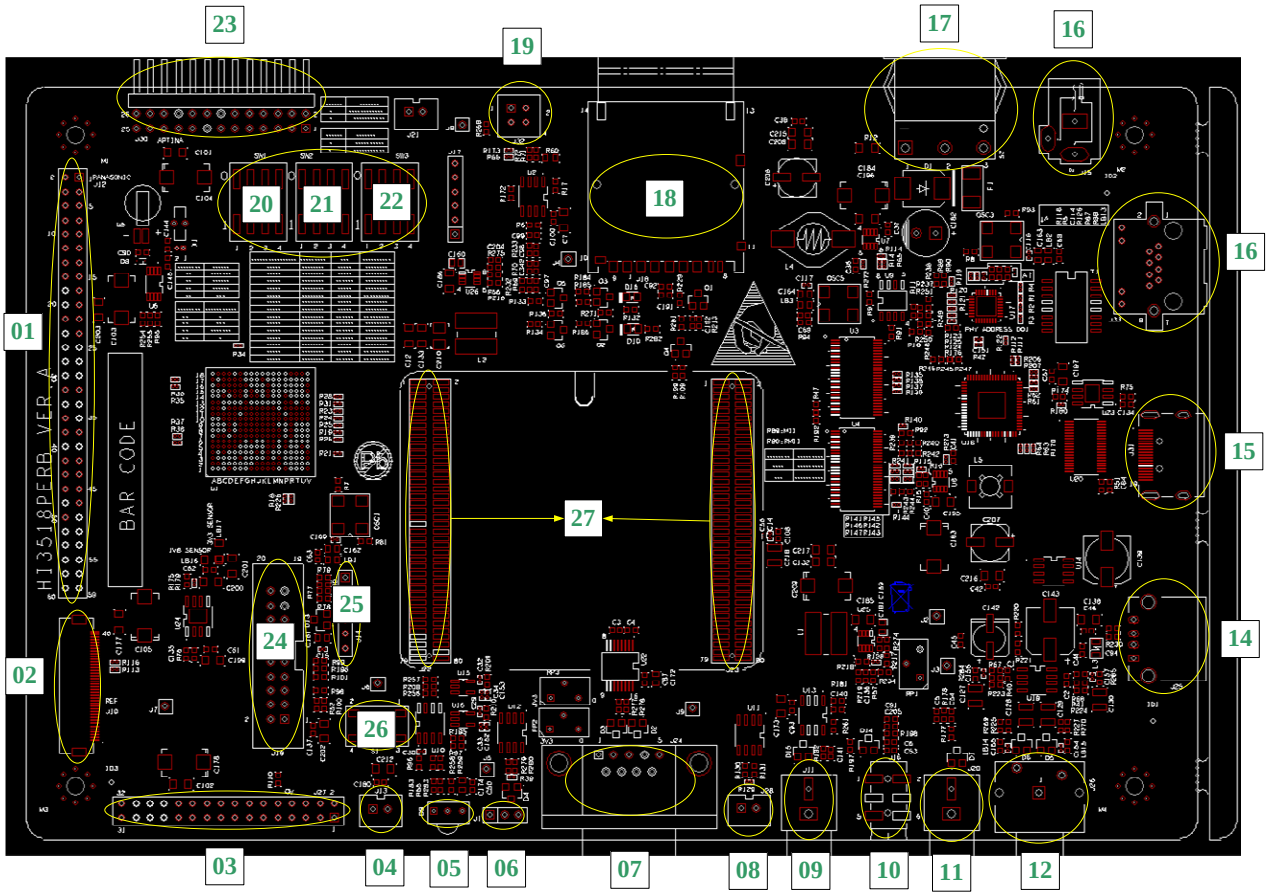


Table 2-1 describes the interfaces shown in Figure 2-2.

Table 2-1 Peripheral interfaces on the Hi3518 peripheral board

No.	Description
1	60-pin sensor connector, for connecting the peripheral board to the Panasonic or Sony sensor demo board
2	40-pin flexible printed circuit (FPC) connector, which is customized by HiSilicon
3	32-pin sensor connector, for connecting the peripheral board to the OV sensor demo board
4	5 V power connector
5	IR receiver
6	UART1 RS485 interface
7	UART0 debug serial port
8	UART2 RS485 interface
9	CVBS interface

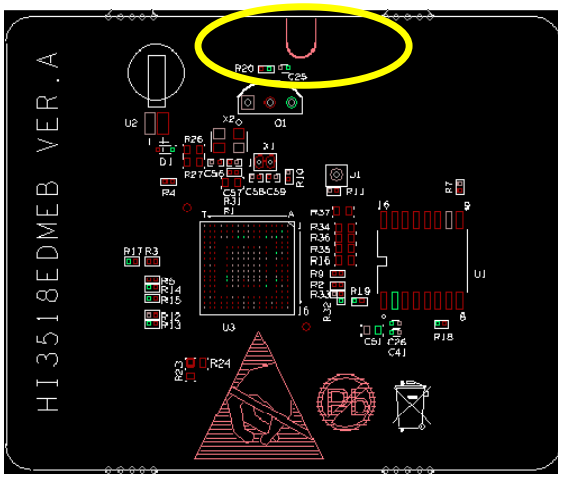
No.	Description
10	Microphone (MIC) IN interface
11	Line IN interface
12	Line OUT interface
13	USB port
14	HDMI interface
15	Ethernet port
16	12 V power adapter connector
17	Board switch
18	SD card interface
19	Automatic iris (AI) debug interface
20	Dual in-line package (DIP) SW1
21	DIP SW2
22	DIP SW3
23	26-pin sensor connector, for connecting the peripheral board to the Aptina sensor demo board
24	Hi3518E Joint Test Action Group (JTAG) interface
25	Complex programmable logic device (CPLD) JTAG interface
26	Reset button
27	Connector for connecting the peripheral board to the Hi3518E core board

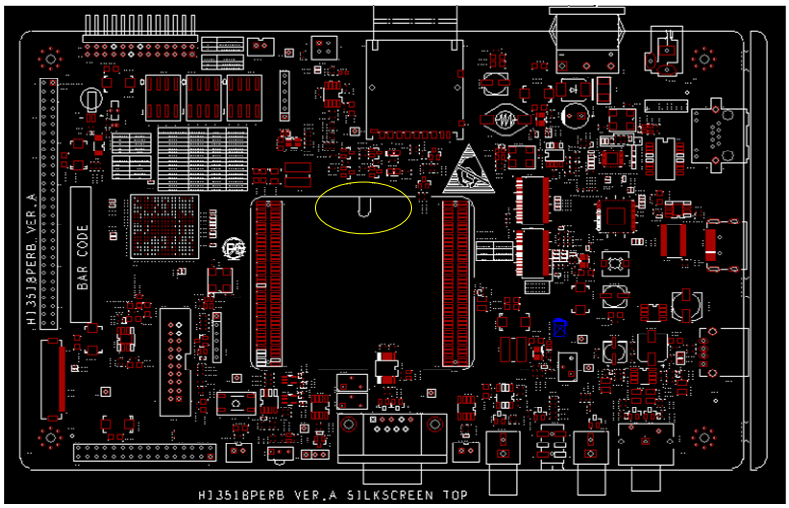
NOTE

For details about how to set DIP switches, see Table 3-1.

As shown in Figure 2-3, the upper part is the Hi3518E core board and the lower part is the peripheral board. Ensure that the U-shaped troughs in the yellow ellipses are in the same direction when connecting the Hi3518E core board to the peripheral board.

Figure 2-3 Placing the Hi3518E core board and peripheral board properly





2.2 GPIO Distribution

Table 2-1 describes the general-purpose input/output (GPIO) distribution for the Hi3518E demo board.

Table 2-1 GPIO distribution for the Hi3518E demo board

GPIO	Function	Board Processing Mode
JTAG_TRSTN/GPIO0_0/TEMPER_DQ	JTAG interface on the simulator	A 10 kΩ pull-down resistor is connected.
JTAG_TCK/GPIO0_1/TEMPER_DQ		A 1 kΩ pull-down resistor is connected.
JTAG_TMS/GPIO0_2/TEMPER_DQ		A 4.7 kΩ pull-up resistor is connected.

GPIO	Function	Board Processing Mode
JTAG_TDO/GPIO0_3/TEMPER_DQ		A 4.7 kΩ pull-up resistor is connected.
JTAG_TDI/GPIO0_4/TEMPER_DQ		A 4.7 kΩ pull-up resistor is connected.
FLASH_TRIG/GPIO1_7	Camera flash trigger pin The camera flash is triggered when the low level is retained for more than 10 ms. The level is high by default.	None
SHUTTER_TRIG/GPIO1_0	Shutter trigger pin. The level is high by default.	None
PWM_OUT0/GPIO5_2	AI pulse width modulation (PWM) control pin. The level is low by default.	None
PWM_OUT1/GPIO5_3	Reserved	None
UART1_RTSN/GPIO2_2	UART1 485 receive/transmit (RX/TX) control pin 0: RX 1: TX	None
UART1_CTSN/GPIO2_4	UART2 485 RX/TX control pin 0: RX 1: TX	None
GPIO0_5/SVB_PWM/TEMPER_DQ	ETH PHY reset pin 0: reset 1: deassert reset	None
GPIO0_6/SVB_PWM/TEMPER_DQ	Core selective voltage bing (SVB) PWM output pin	None
GPIO0_7/SYS_RSTN_OUT/TEMPER_DQ	DS18B20 function verification	None
SDIO_CARD_POWER_EN/GPIO6_1	SD card power-on enable 0: power off 1: power on	A 4.7 kΩ pull-down resistor is connected.

GPIO	Function	Board Processing Mode
SDIO_CARD_DETECT/GPIO6_0	SD card detection 0: detected 1: default value	A 4.7 kΩ pull-up resistor is connected.
SDIO_CWPR/GPIO6_2	SD card write protection detection 0: no protection 1: write protection	A 4.7 kΩ pull-up resistor is connected.
USB_OVRCUR/GPIO5_0	USB over-current detection, active low	A 10 kΩ pull-up resistor is connected.
USB_PWREN/GPIO5_1	USB power-on enable 0: power off 1: power on	A 4.7 kΩ pull-down resistor is connected.
GPIO9_0/1/2/3/4/5/6/7	Common I/O port, reserved	None

2.3 I²C Address

The following are the configurations of the inter-integrated circuit (I^2C) addresses for the peripherals of the Hi3518E demo board:

- SIL9024: 0x72
- RTC: 0x68

2.4 Implementation of Multiple Functions of the Demo Board

Do as follows to implement multiple functions of the Hi3518E demo board:

- The multiplexing functions of the board sensor interface are switched by controlling the CPLD, which is implemented by setting the DIP switch SW1. For details, see the description of SW1 in Table 3-1.
- The board ETH pin is multiplexed with the BT.1120 pin. The function is switched by setting the DIP switch SW1. For details, see the description of SW1 in Table 3-1.
- The demo board works in media independent interface (MII) mode by default, and the clock is provided by the Hi3518E by default. Table 2-1 describes the settings for switching the MII mode and reduced media independent interface (RMII) mode.

Table 2-1 Settings for switching the MII mode and RMII mode

Mode	PHY Clock Source	Resistors to Be Connected	Resistors to Be Disconnected
MII	Hi3518E	R237, R239, R241, R246, R247, R248	R238, R240, R242, R245, R250, R251
MII	25 MHz crystal	R238, R239, R241, R246, R247, R248	R237, R240, R242, R245, R250, R251
RMII	Hi3518E	R240, R242, R248, R245, R237	R238, R239, R241, R250, R246, R247, R251
RMII	25 MHz crystal	R240, R242, R251, R245, R250, R237	R238, R239, R241, R246, R247, R248

3 Operation Guide

3.1 Notes

The Hi3518E demo board applies to the laboratory or engineering development environment. Take the following precautions before performing operations:

CAUTION

Never perform the hot-swap operation on the board in any case.

- Take antistatic measures before unpacking or installing the board to prevent the board hardware from being damaged by the electrostatic discharge (ESD).
- Hold the board on the edge and do not touch the exposed metal on the board. Otherwise, the board components may be damaged by ESD.
- Place the Hi3518E demo board on a dry plane and keep them away from heat sources, electromagnetic interference sources, radiant sources, and electromagnetic susceptibility equipment such as the medical equipment.
- Familiarize yourself with the layout of the Hi3518E demo board by referring to Figure 2-1 and Figure 2-2. Ensure that you can identify the operational components (such as the switches and connectors) and know the indicator positions.

3.2 Setting the Board

The operating mode and video/audio input and output channels of the Hi3518E are selected by setting the DIP switches on the Hi3518E demo board. See Table 3-1 and Table 3-2.

NOTE

SW1 is set to **0111**, SW2 is set to **0001**, and SW3 is set to **0001** by default. Check the settings of these DIP switches before operations.

Table 3-1 Settings of the DIP switches on the demo board

No.	Pin	Description
SW1	Pin (2, 1)	Sensor interface select 00: 60-pin sensor connector 01: 26-pin sensor connector 10: 32-pin sensor connector 11: 40-pin FPC connector For details, see Table 2-1.
	Pin (4, 3)	ETH and BT.1120 switch 00: reserved 01: ETH 10: BT1120 11: reserved
SW2	Pin 1	JTAG_EN 0: disabled 1: enabled
	Pin 2	POR select 0: enabled 1: disabled
	Pin3	Reserved
	Pin 4	Reserved
SW3	Pin 4	Reserved
	Pin 3	Reserved
	Pin 2	Reserved
	Pin 1	Reserved

NOTE

If a DIP switch is set to a value that is not listed in Table 3-1, the CPLD will output high impedance.

where

- 60-pin sensor connector (marked with J12 on the peripheral board): connects the peripheral board to the Panasonic or Sony sensor demo board.
- 26-pin sensor connector (marked with J30): connects the peripheral board to the Aptina sensor demo board.
- 32-pin sensor connector (marked with J27 on the peripheral board): connects the peripheral board to the OV sensor demo board.
- 40-pin FPC connector (marked with J10 on the peripheral board): customized by HiSilicon

Table 3-2 Board settings in various boot modes

Boot Mode	Value	Resistor Connection	Remarks
BOOT_SEL	1	On the peripheral board, R47 is connected and R192 is removed.	The NAND flash is not supported. Never set BOOT_SEL to **1**.
	0	On the peripheral board, R192 is connected and R47 is removed.	The system boots from the SPI flash.
SFC_ADDR_MODE	1	For the Hi3518E core board, R32 is connected and R33 is removed.	The default addressing mode of the SPI flash is 4-byte mode.
	0	For the Hi3518E core board, R33 is connected and R32 is removed.	The default addressing mode of the SPI flash is 3-byte mode.

3.3 Connecting the Sensor Board to the Demo Board

The Hi3518E supports various sensors. The I/O power of the sensor is 1.8 V or 2.8 V/3.3 V.

The sensor interface on the Hi3518E demo board supports the 1.8 V or 2.8 V/3.3 V I/O power. The 2.8 V/3.3 V I/O power is connected by default. If you want to connect the sensor interface to a 1.8 V I/O power, you need to change the soldering position of the electromagnetic interference (EMI) bead on the board.

As shown in Figure 3-1, the EMI bead can be soldered on either of the positions in the yellow ellipse: LB16 (corresponding to the silkscreen 1V8 SENSOR) and LB17 (corresponding to the silkscreen 3V3 SENSOR). The EMI bead is soldered on LB17 on the board by default. In this case, the sensor boards with 2.8 V/3.3 V I/O power such as AR0130 and 9M034 are supported. To support the sensor boards with 1.8 V I/O power such as IMX104 and IMX122, you need to solder the EMI bead on LB16.

Note that the sensor connector is J10 (40-pin FPC connector).

Figure 3-1 Sensor interface on the Hi3518E demo board