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MCIMX53SMD Board Hardware User's Guide

IMX53SMDHUG
Rev. 0
9/2011

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1. Introduction

The MCIMX53SMD Board Hardware User's Guide is a user manual that describes the design and usage of the MCIMX53SMD board, which is a printed circuit board (PCB) based on Freescale Semiconductor's i.MX53 Applications Processor (AP). This guide specifies the basic architecture of the MCIMX53SMD board and explains the design and purpose of each component of the board. It also tells how developers can use the MCIMX53SMD board in their various development works.

1.1. MCIMX53SMD Board Overview

The MCIMX53SMD board is an i.MX53 platform that provides many widely used features of the i.MX53 Applications Processor in a tablet package. Being a complete development platform, the MCIMX53SMD board has a design structure that is almost similar to the more complex i.MX53 platforms. This helps developers to port code developed on the MCIMX53SMD board to other boards with minimal effort. Developers can use the MCIMX53SMD board to test the features of the i.MX53 Applications Processor, before investing a large amount of money or resources in more specific designs. **Figure 1-1** shows an MCIMX53SMD board with a debug card and a display.

Figure 1-1. MCIMX53SMD Board with a Debug Card and a Display

The different components of the MCIMX53SMD board are listed in **Table 1-1**.

Component	Description
Processor	Freescale Applications Processor – MCIMX535DVV1B/ MCIMX535DVV1C
DRAM memory	Micron 8 GB DDR3 SDRAM – MT41J128M16HA-125
PMIC	Dialog Semiconductor – DA9053
DCDC/charger	Maxim – MAX17085B

Mass storage	One SD/MMC/SDIO card connector
	8/32 GB SSD SATA
	4 MB SPI-NOR Flash
	8 GB eMMC
Video output	40-pin VGA Dock
	19-pin Mini-HDMI connector
	Two 30-pin LVDS connectors
USB	Two high speed (HS) USB 2.0 Standard-A host connectors
	Micro-B OTG connectors
Audio connectors	3.5 mm Stereo Headphone output
	Mono-Microphone input on board
	Two 1W at 8Ω speakers
Power connectors	15V connector
Debug connectors	9-pin D-Sub Debug UART connector
	RJ-45 connector for 10/100 Base-T
	20-pin Standard ARM JTAG connector
Peripheral	WiFi/BT card
	GPS module
	ZigBee
	5M-pixel camera sensor
Sensor	eCOMPASS
	Accelerometer
	Light sensor
Expansion header	120-pin header (populated) to support the optional WVGA and WQVGA LCD display daughter cards (orderable)
User interface buttons	Power, Reset, Vol+, and Vol- buttons
	Electrode touch keypad
Indicators	Six status LEDs, for example, external power, WiFi, and debug
Li-ION battery connector	5-pin header for Li-ION battery
Coin cell	Connection point for 2-pin coin cell required in RTC operation
PCB	200 mm x 166 mm, 8-layer board

Table 1-1. MCIMX53SMD Board Components

1.2. MCIMX53SMD Board Kit Contents

The MCIMX53SMD board comes with the following items:

- MCIMX53SMD main board
- MCIMX53SMD debug board
- Power supply (100/240V input, 15V 3A output)
- 3-cell Li-ion Battery and Charger (will be available in Q4, 2011)
- HDMI to HDMI cable
- Quick Start guide
- DVD, MCIMX53SMD, i.MX53 Getting Started

2. List of Acronyms

The acronyms used in this document are listed in Table 2-1.

Acronym	Used For
AC97	Audio Codec ‘97
CMC	Common Mode Choke
CODEC	Compression/Decompression
DDR	Double Data Rate
DNP	Do Not Populate
HDMI	High Definition Multimedia Interface
I2C	Inter-Integrated Circuit
I2S	Integrated Interchip Sound
IC	Integrated Circuit
IDE	Integrated Debug Environment
LAN	Local Area Network
QSB	Quick Start Board
LCD	Liquid Crystal Display
LPDDR2	Low Power DDR2
MMC	Multi Media Card
PMIC	Power Management Companion IC
RMII	Reduced Media Independent Interface
RTC	Real-Time Clock
SDRAM	Synchronous Dynamic Random Access Memory
SD	Secure Digital
SPI	Serial Peripheral Interface
SSI	Synchronous Serial Interface
ULPI	UTMI Low Pin Interface
USB	Universal Serial Bus
UTMI	Universal Transceiver Macrocell Interface
WDOG	Watch Dog
WLAN	Wireless LAN

Table 2-1. List of Acronyms

3. Specifications

3.1. i.MX53 Applications Processor

The i.MX53 processor is based on ARM Cortex-A8™ Platform, which has the following features:

- MMU, L1 Instruction and L1 Data Cache
- Unified L2 cache
- Target frequency of the core (including Neon, VFPv3, and L1 Cache) is 1-1.2 GHz; target frequency of the MCIMX53SMD platform is 1 GHz
- Neon coprocessor (SIMD Media Processing Architecture) and Vector Floating Point (VFP-Lite) coprocessor supporting VFPv3
- TrustZone

The memory system of the processor consists of the following components:

- Level 1 Cache:
  - Instruction (32 Kbyte)
  - Data (32 Kbyte)
- Level 2 Cache:
  - Unified instruction and data (256 Kbyte)
- Level 2 (internal) memory:
  - Boot ROM, including HAB (64 Kbyte)
  - Internal multimedia/shared, fast access RAM (128 Kbyte)
  - Secure/non-secure RAM (16 Kbyte)
- External memory interfaces:
  - 16/32-bit DDR2-800, LV-DDR2-800 or DDR3-800 up to 2 Gbyte
  - 32 bit LPDDR2
  - 8/16-bit NAND SLC/MLC Flash, up to 66 MHz, 4/8/14/16-bit ECC
  - 16-bit NOR Flash. All WEIMv2 pins are muxed on other interfaces (data with NFC pins). I/O muxing logic selects WEIMv2 port, as primary muxing at system boot.
  - 16-bit SRAM, cellular RAM
  - Samsung One NANDTM and managed NAND including eMMC up to rev 4.4 (in muxed I/O mode)

The i.MX53 processor system is built around the following system-on-chip (SoC) interfaces:

- 64-bit AMBA AXI v1.0 bus: Used by ARM platform, multimedia accelerators (such as, VPU, IPU, GPU3D, GPU2D) and the external memory controller (EXTMC) operating at 200 MHz.
- 32-bit AMBA AHB 2.0 bus: Used by the rest of the bus master peripherals operating at 133 MHz.
- 32-bit IP bus: Peripheral bus used for control (and slow data traffic) of the most system peripheral devices operating at 66 MHz.

The i.MX53 processor makes use of dedicated hardware accelerators to achieve state-of-the-art multimedia performance. The use of hardware accelerators provides both high performance and low power consumption while freeing up the CPU core for other tasks.

The i.MX53 processor incorporates the following hardware accelerators:

- VPU, version 3: Video processing unit
- GPU3D: 3D graphics processing unit, OpenGL ES 2.0, version 3, 33 Htri/s, 200 Mpix/s, and 800 Mpix/s z-plane performance, 256 KB RAM memory.
- GPU2D: 2D graphics accelerator, OpenVG 1.1, version 1, 200 Mpix/s performance.
- IPU, version 3M: Image processing unit

- ASRC: Asynchronous sample rate converter

The i.MX53 processor includes the following interfaces to external devices:

NOTE

Not all the interfaces are available simultaneously depending on I/O multiplexer configuration.

- Hard disk drives:
  - PATA, up to U-DMA mode 5, 100 MByte/s
  - SATA II, 1.5 Gbps
- Displays:
  - Five interfaces: Total rate of all interfaces is up to 180 Mpixels/s, 24 bpp. Up to two interfaces may be active as once.
  - Two parallel 24-bit display ports: The primary port is up to 165 Mpix/s (for example, UXGA at 60 Hz).
  - LVDS serial ports: One dual channel port up to 165 Mpix/s or two independent single channel ports up to 85 MP/s (for example, WXGA at 60 Hz) each.
  - TV-out/VGA port up to 150 Mpix/s (for example, 1080p60).
- Camera sensors:
  - Two parallel 20-bit camera ports. Primary up to 180-MHz peak clock frequency and secondary up to 120-MHz peak clock frequency.
- Expansion cards:
  - Four SD/MMC card ports: Three supporting 416 Mbps (8-bit interface) and one enhanced port supporting 832 Mbps (8-bit, eMMC 4.4)
- USB
  - HS USB 2.0 OTG (up to 480 Mbps), with integrated HS USB PHY
  - Three USB 2.0 (480 Mbps) hosts:
    - High-speed host with integrated on-chip high speed PHY
    - Two high-speed hosts for external HS/FS transceivers through ULPI/serial, support IC-USB
- Miscellaneous interfaces:
  - One-wire (OWIRE) port
  - Three I2S/SSI/AC97 ports, supporting up to 1.4 Mbps, each connected to audio multiplexer (AUDMUX) providing four external ports.
  - Five UART RS232 ports, up to 4.0 Mbps each. One supports eight-wire and the other four support four-wire.
  - Two high speed enhanced CSPI (ECSPI) ports and one CSPI port
  - Three I2C ports, supporting 400 kbps
  - Fast Ethernet controller, IEEE1588 V1 compliant, 10/100 Mbps
  - Two controller area network (FlexCAN) interfaces, 1 Mbps each
  - Sony Philips Digital Interface (SPDIF), Rx and Tx
  - Enhanced serial audio interface (ESAI), up to 1.4 Mbps each channel
  - Key pad port (KPP)
  - Two pulse-width modulators (PWM)
  - GPIO with interrupt capabilities
  - Secure JTAG controller (SJC)

The system supports efficient and smart power control and clocking:

- Supporting DVFS (Dynamic Voltage and Frequency Scaling) and DPTC (Dynamic Process and Temperature Compensation) techniques for low power modes.

- Power gating SRPG (State Retention Power Gating) for ARM core and Neon
- Support for various levels of system power modes
- Flexible clock gating control scheme
- On-chip temperature monitor
- On-chip oscillator amplifier supporting 32.768 kHZ external crystal
- On-chip LDO voltage regulators for PLLs

Security functions are enabled and accelerated by the following hardware:

- ARM TrustZone including the TZ architecture (separation of interrupts, memory mapping, and so on)
- Secure JTAG controller (SJC): Protecting JTAC from debug port attacks by regulating or blocking the access to the system debug features.
- Secure real-time clock (SRTC): Tamper resistant RTC with dedicated power domain and mechanism to detect voltage and clock glitches.
- Real-time integrity checker, version 3 (RTICv3): RTIC type 1, enhanced with SHA-256 engine
- SAHARAv4 Lite: Cryptographic accelerator that includes true random number generator (TRNG)
- Security controller, version 2 (SCCv2): Improved SCC with AES engine, secure/nonsecure RAM and support for multiple keys as well as TZ/non-TZ separation.
- Central Security Unit (CSU): Enhancement for the IIM (IC Identification Module). CSU is configured during boot and by eFUSEs and determines the security level operation mode as well as the TrustZone (TZ) policy.
- Advanced High Assurance BOOT (A-HAB): HAB with the next embedded enhancements: SHA-256, 2046-bit RSA key, version control mechanism, warm boot, CSU, and TZ initialization.

3.2. DDR3 DRAM Memory

The MCIMX53SMD board uses four 2-Gigabit DDR3 SDRAM ICs manufactured by Micron for a total onboard RAM memory of 1 GB. The SDRAM data width for each IC is 16 bits. The chips are arranged in pairs and they are controlled by the two chip select pins to form 32-bit words for the i.MX53 CPU. The On Die Termination (ODT) functionality has been implemented on the board. In addition, the board provides the ability to separate the I/O Voltage Supply from the main SDRAM Voltage Supply, if desired.

3.3. Dialog DA9053 PMIC

The DA9053 device is a small (7 x 7 mm, 0.5 mm pitch) 169 ball VFBGA that provides nearly all power supply functions for the MCIMX53SMD board. The DA9053 PMIC enhances the functionality of the MCIMX53SMD board by providing the following features:

- Power Supply resources:
    - 12 Low Drop Out (LDO) regulators
        - One for internal PMIC purposes only (LDOCORE)
        - One for charging optional back up coin cell
        - 10 for platform needs
    - Four DC/DC Buck Converters (three with DVS)
        - One for the ARM Core supply (VBUCKCORE)
        - One for the Peripheral Core supply (VBUCKPRO)
        - One for the external SDRAM memory (VBUCKMEM)
        - One for the internal cache memory (VBUCKPERI)
    - One White LED driver and boost converter
- Li-ION battery charger
- Resistive touch screen interface

- Expansion Port Card ID detect
- Wall voltage supply with over-voltage protection
- One HS-I2C interface
- External LDO regulator enable

3.4. Max17085B DCDC and Charger

The MAX17085B is an all-in-one notebook power solution that comprises of a multi-cell battery charger, dual fixed output Quick-PWM step-down controllers, and dual keep-alive linear regulators:

- One multi-cell battery charger
- Two DC/DC Buck Converters
    - One for the 3.3V supply
    - One for the 5V supply
- Two Low Drop Out (LDO) regulators
    - One for the 3.3V supply
    - One for the 5V supply

3.5. Mini-HDMI Connector (J25)

The mini-HDMI connector is used as HDMI output of MCIMX53SMD board. The power source for the HDMI Bridge SiI9022 is DCDC_3V3_BB, and the power source for mini-HDMI connector is DCDC_5V_BB.

3.6. SD Card Slot (J13)

The SD Card slot is a 5-in-1 SD/MMC connector that acts as memory media slot. The power source for the SD Card Slot is the auxiliary DCDC buck (DCDC_3V3_BB). The SD Card slot can be configured as the boot source with an alternate boot option setting. It can also be configured for either SD or MMC card operation (see the Boot Mode Operations and Selections section). The SD Card Slot supports full 4-bit parallel data transfers and can support SDIO cards (such as, WiFi and BT) designed to fit in a standard SD card slot.

3.7. SATA Connector (J5)

The SATA connector provides a means to connect an external SSD SATA drive to the MCIMX53SMD board. Power for the SATA drive needs to be supplied by SATA_5V and SATA_3V3. The developer can use boot configure to boot the SATA drive.

3.8. VGA Dock (J131)

A Dock with VGA signal is on the MCIMX53SMD board. VGA is the output that comes directly from the i.MX53 processor with minimum external components required. Power for the TVE module of the i.MX53 processor is supplied by VLDO7 of the PMIC and is set to 2.75V. If VGA output is not desired, the PMIC can be programmed to turn off VLDO7 to conserve power. The VGA output supports a variety of video formats up to 150 Megapixels per second. Level shifters are required on the Horizontal and Vertical Synchronization signals as well as the VGA I2C communications signals in order to meet VGA specifications. Meanwhile, Audio LINEIN and LINEOUT are supported on the Dock. The Audio LINEIN and LINEOUT are from SGTL5000 on MCIMX53SMD board. Another feature on Dock is USB.

3.9. LVDS Video Output (J28, J29)

The LVDS module of the i.MX53 processor is connected to two 30-pin LVDS connectors. Both connectors are pinned out on the MCIMX53SMD board, though the i.MX53 processor is capable of outputting to two separate LVDS displays. The pin outs on the LVDS connector match the optional cable and 10” HannStar LVDS display

(both can be purchased from Freescale). The single LVDS connector will support video formats up to 165 Megapixels per second. The power source for the LVDS module is a switchable output of the VBUCKPERI DCDC converter. This rail is shared with the SATA module and the USB module. If these modules are not used, the PMIC can be programmed to turn off power to these three modules, without affecting the 2.5V supplies to other portions of the i.MX53 processor.

3.10. Ethernet (on Debug Board)

The i.MX53 processor Fast Ethernet Module outputs RMII formatted signals to an external Ethernet PHY. The processor is capable of 10/100 Base-T speeds. The MCIMX53SMD board uses the SMSC LAN8720A Ethernet Transceiver in a QFN-24 package. The Ethernet IC is powered by a 3.3V supply from DCDC_3V3_BB. The output of the Ethernet PHY is connected to the debug board.

3.11. Dual USB Host Connector (J31, J32)

The USB module of the i.MX53 processor provides a high speed USB PHY that is connected to a USB HUB (USB2514). Two of the USB ports are dedicated to USB HOST. Both jacks receive 5V power from DCDC_5V through a power monitor that can be controlled by software.

3.12. Micro-B USB Device Connector (J34)

The micro USB connector is connected to the USB OTG PHY on the i.MX53 processer and supports full OTG function.

3.13. Audio Input/Output (P1/J130/CON1)

Analog audio input and output are provided by Freescale's Low Power Stereo Codec, SGTL5000. The audio codec is connected to the i.MX53 processor through four-wire I2S communications, utilizing the AUDMUX5 port of the processor. The audio codec's Headphone Amp provides up to 58 mW output to 16Ω headphones at a typical SNR of 98 dB and THD+N of -86 dB. Typical power consumption is 11.6 mW. In addition, the audio codec can perform several enhancements to the output, including virtual surround, added bass, and three different types of equalization. The Microphone Input module of the Stereo Codec is also used, while the microphone is applied on the MCIMX53SMD board. A Headphone Jack (J130) and Speaker Connector (CON1) are on the MCIMX53SMD board. A 3.5 mm Headphone with plug-in detect is supported. Two speakers with 8Ω impedance rating and 1W power rating are attached through a power amplifier (TS4984IQT).

3.14. 15V Power Connector (J35)

A 2.0 mm x 6.5 mm barrel connector is used which should fit standard DC Plugs with an inner dimension of 2.1 mm and an outer dimension of 5.5 mm. If a secondary power supply is used, it should not supply more than 15V power at 3A output. If the PMIC senses too high voltage at the connector input, it will turn off to protect the MCIMX53SMD board. If a Wall Power Supply is connected to the MCIMX53SMD board, the red 15V power LED indicator will light.

3.15. Mini-PCIe Connector (J15, J18)

Two mini-PCIe connectors are on the MCIMX53SMD board. One for 3G modem, the other is for WiFi/BT. The MCIMX53SMD board provides just a standard mini-PCIe slot for 3G Modem. So, the developers can use a 3G Modem of their choice. For the WiFI/BT module, the MCIMX53SMD board uses the module based on the Atheros. The module pin map is not compatible with the standard mini-PCIe. Therefore, care must be taken to plug the module to the right mini-PCIe slot.

3.16. CMOS Sensor Connector (J12)

The MCIMX53SMD board supports a 5 Megapixels CMOS Camera. The CMOS module is based on the OmniVision chipset, OV5642. Auto Focus (AF) function is not supported on the board. The developer can choose another CMOS module on their project, if the pin map is compatible. The MCIMX53SMD board uses CMOS connector, FX12B-40P-0.4SV, from HIROSE.

3.17. Debug UART Connector (on Debug Board)

UART1 of the i.MX53 processor is connected to an RS-232 output to be used as a debug output for the developer. The Transmit (TX) and Receive (RX) signals are sent through two 1.8V to 3.2V level shifters to convert the logic signal voltages to the correct values for the Sipex SP3232 RS-232 transceiver. The CTS and RTS signals are not used on the MCIMX53SMD board. The RS-232 transceiver receives its power from the external 3.3V LDO regulator. If the output of the regulator is turned off for power savings measures, debug output will be lost.

If the designer wishes to use the port as an Applications UART Port, changes can be made in software to reconfigure the port. A male-to-male gender changer can be used to properly convert the port.

To access the debug data output during development, connect the Debug UART Connector to a suitable host computer and open a terminal emulation program (that is, Teraterm or HyperTerminal). Proper settings for the terminal program are:

- BAUD RATE: 115,200
- DATA: 8 bit
- PARITY: None
- STOP BIT: 1-bit
- FLOW CONTROL: None

3.18. JTAG Connector (on the Debug board)

A standard 20-pin ARM JTAG connector is provided on the MCIMX53SMD board. Logic signals to the JTAG connector are 1.8V signals. A 1.8V reference signal is provided to pin one of the connectors so that the attached JTAG tool can automatically configure the logic signals for the right voltage. If the JTAG tool does not have an automatic logic voltage sense, then, make sure that the tool is configured for 1.8V logic.

JTAG tools that have been specifically tested with the MCIMX53SMD board are:

- CodeWarrior (Freescale)
- JTAG Commander (Macraigor)
- J-Link (Segger/Codesourcery)
- J-Link (IAR)

3.19. Expansion Header (J78)

A 120-pin Expansion Port Header is provided on the MCIMX53SMD board which can be used with many optionally expansion boards available from Freescale, or with custom designed boards made be the developer. The Expansion Port makes the following features of the i.MX53 processor available for being used on a custom built expansion card:

- Two Inter-Integrated Circuits (I2C): I2C1, I2C2
- 24-bit data and display control signals
- Resistive Touch Screen Interface
- Various voltage rails

3.20. Function Buttons

The MCIMX53SMD board provides two user interface buttons, which are discussed below.

3.20.1. POWER Button

In the 'Power Off' state, momentarily pressing the POWER button will begin the PMIC power up cycle. The PMIC supplied voltage rails will come up in the proper sequence to power the i.MX53 processor. When the processor is fully powered, the boot cycle will be initiated.

In the 'Power On' state, momentarily pressing the POWER button will send a signal to a GPIO port for user defined action, but will not initiate a hardware shutdown.

In the 'Power On' state, holding the power button down for more than 5 seconds will result in the PMIC initiating a shutdown to the 'Standby' power condition. This will also be the result from the 'Power Off' state as the PMIC will transition into the 'Power On' state and will still see the POWER button as held down.

3.20.2. RESET Button

Pressing the RESET button in the 'Power On' state will force the i.MX53 processor to immediately turn off, and reinitiate a boot cycle from the Processor Power Off state. The RESET button has no effect on the PMIC or the voltage rails.
Pressing the RESET button when the MCIMX53SMD board is powered off will have no effect.

3.21. User Interface LED Indicators

There are eight LED status indicators located next to the micro SD card connector. These LEDs have the following functions:

- 15V: The 15V status LED (D29) is a Red LED connected directly to the 15V power rail. This LED indicates that 15V wall power is being properly supplied to the MCIMX53SMD board.
- CMOS Run/Charger Now: This status LED (D27) is a Red LED gated by the EIM_D30 (W4) GPIO pin with two functions. One of these functions is for CMOS running status, the other is dedicated to the status of charger.
- USER Debug/Charger Done: This LED (D32) is a Green LED gated by the PATA_DATA1 (L3) GPIO pin with two functions. One of these functions is for User debug, the other is dedicated to the status of charger.
- 3G Status: The 3G modem status LED (D19) is an Orange LED gated 3G WWLAN pin.
- WiFi/BT: The WiFi/Bt status LED (D9, D10). D9 is a Green LED, and as WLAN Active status. D10 is a Blue LED, and as BT Active status.

3.22. Li-ION Battery Connector (J12)

The MCIMX53SMD board provides a footprint (J12) that can be used to solder a five-pin connector. The board has a three-cell Li-ION battery of ~40 Wh. The developer can change it, if needed, and must follow the pin map of the connector.

3.23. Back-Up Coin Cell Posts (BT1)

For proper operation, the coin cell posts should be soldered direction to the MCIMX53SMD board. The DA9053 PMIC will charge the coin cell when Battery or Wall Power is available. When Battery or Wall Power is removed, the coin cell will provide power only to the RTC power rail (VLDO1), supplying power to the i.MX53 processor. The length of time a coin cell can power the RTC subsystem may vary.

4. MCIMX53SMD Board Connectors

The MCIMX53SMD board provides a number of connectors for a variety of inputs and outputs to and from the board. The following subsections describe these connections in detail.

4.1. Wall 15V Power Jack (J35)

The 15V at 3A AC-to-DC power supply that comes with the MCIMX53SMD board is plugged into the Power Jack (J35) on the board, as shown in **Figure 4-1**. To avoid damage to the board, it is recommended not to use unofficial power.

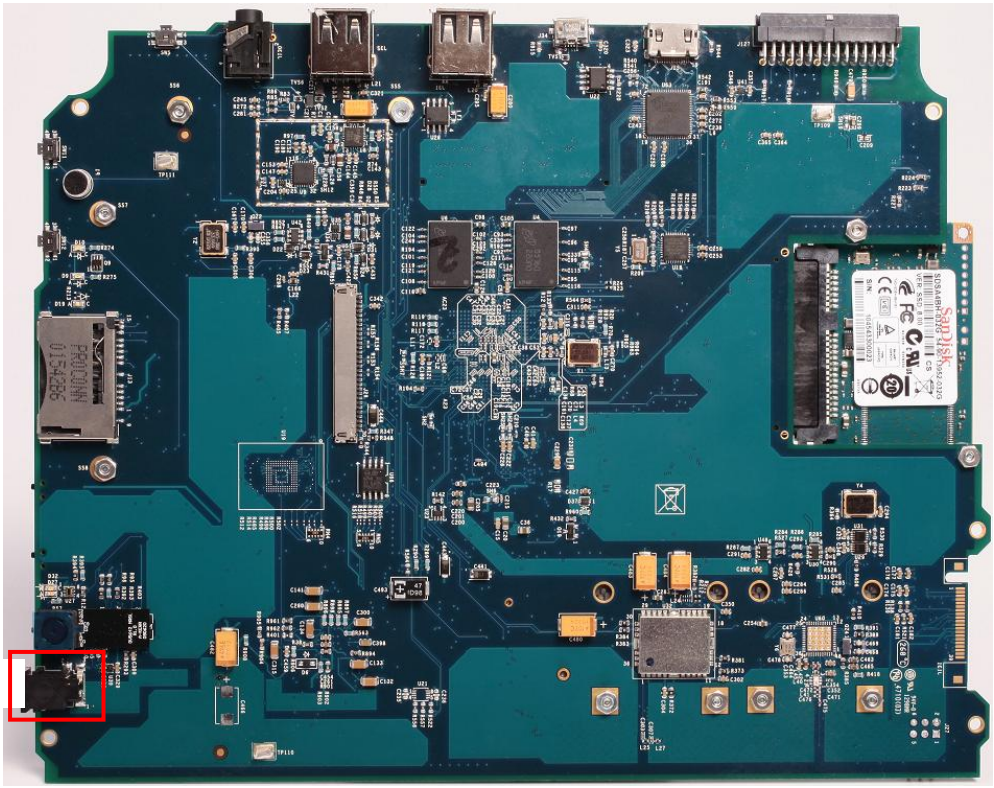

Figure 4-1. DC Power Jack

4.2. SD Card Connector (J13)

The MCIMX53SMD board has one 4-bit SD/MMC connector that can be used for memory, or for third-party SDIO type cards, such as WiFi or Bluetooth. The SD Card Connector (J13) connects a 4-bit parallel data bus to the SD1 port of the i.MX53 processor. The SD Card Connector receives power from DCDC_3V3. The board can be modified to support booting from this connector. See the Boot Mode Operations and Selections section to learn how to modify the board. The SD Card Connector is not spring loaded, so pushing the card into the slot will not initiate an action to disengage the SD Card. The SD Card is inserted facing up at the location shown in **Figure 4-2**.

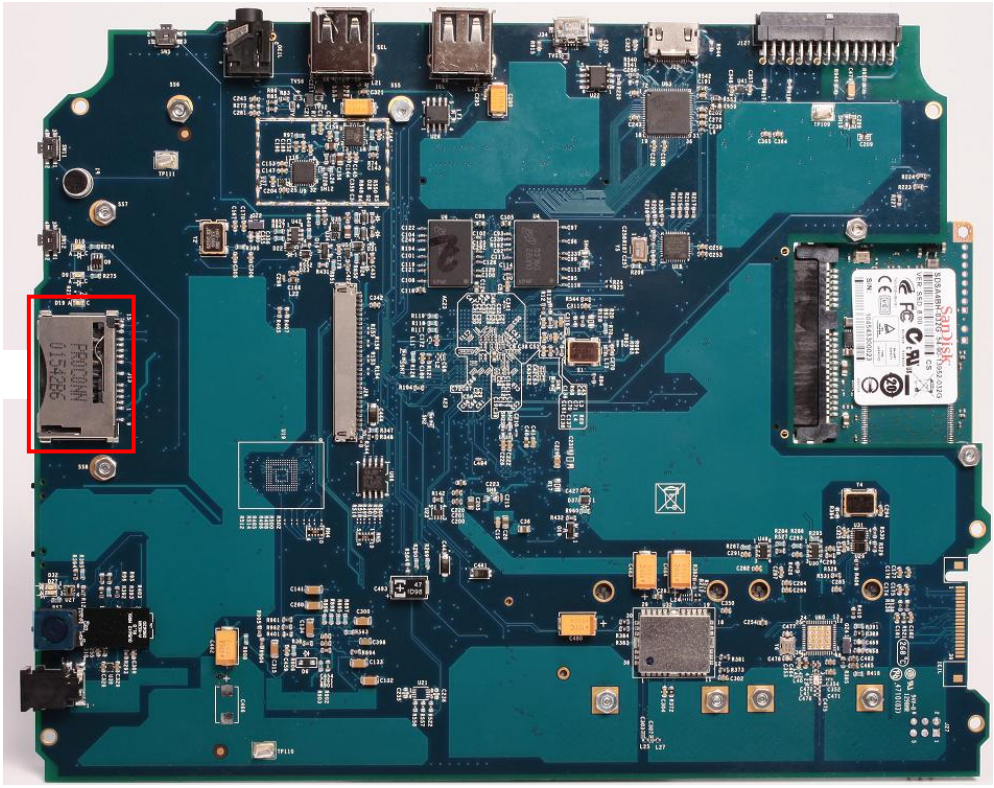

Figure 4-2. SD Connector

4.3. Headphone Output Connector (J130)

Any set of ear buds or headphones with a standard 3.5 mm stereo jack can be connected to the Audio Output jack at the point shown in **Figure 4-3**. Ear buds are not supplied with the MCIMX53SMD board kit.

Headphone Connector (J130)

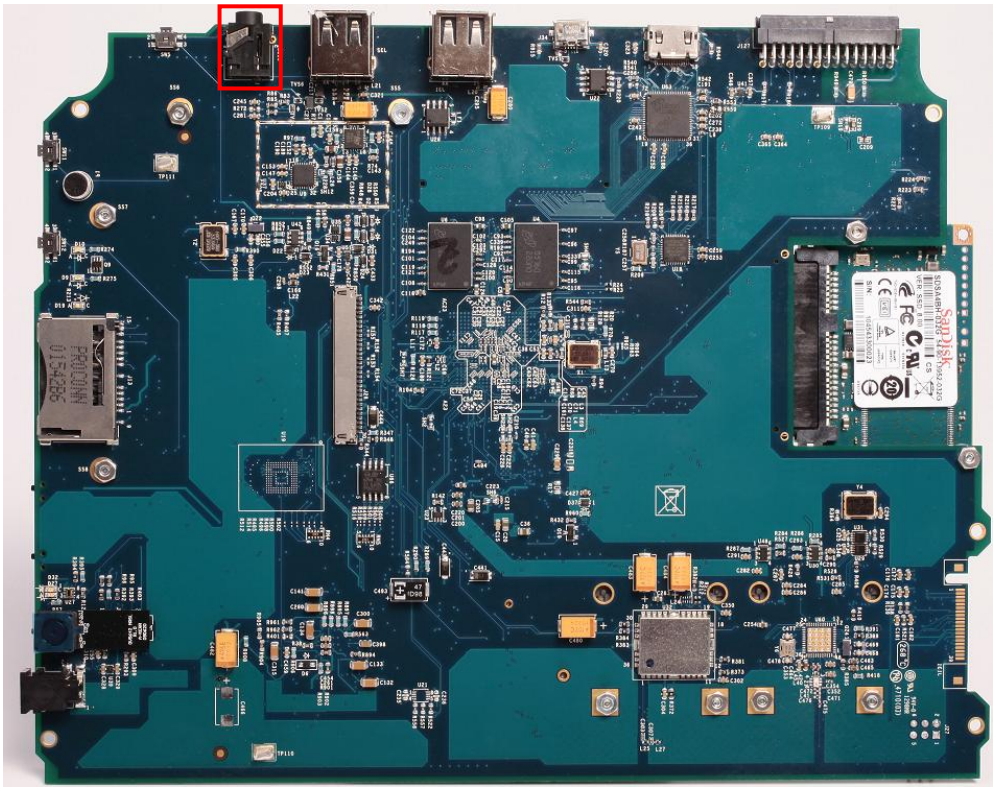

Figure 4-3. Headphone Connector

4.4. Dual USB Host Jack (J31, J32)

The MCIMX53SMD board has two USB Host only connectors that can be used to support USB devices:

- Any single, high-power USB device,
- Any combination of USB devices though a self-powered hub not to exceed 500 mA current draw, or
- Any combination of USB devices through a powered hub.

Dual USB connectors are shown in **Figure 4-4**.

Dual USB HOST Connector (J31, J32)

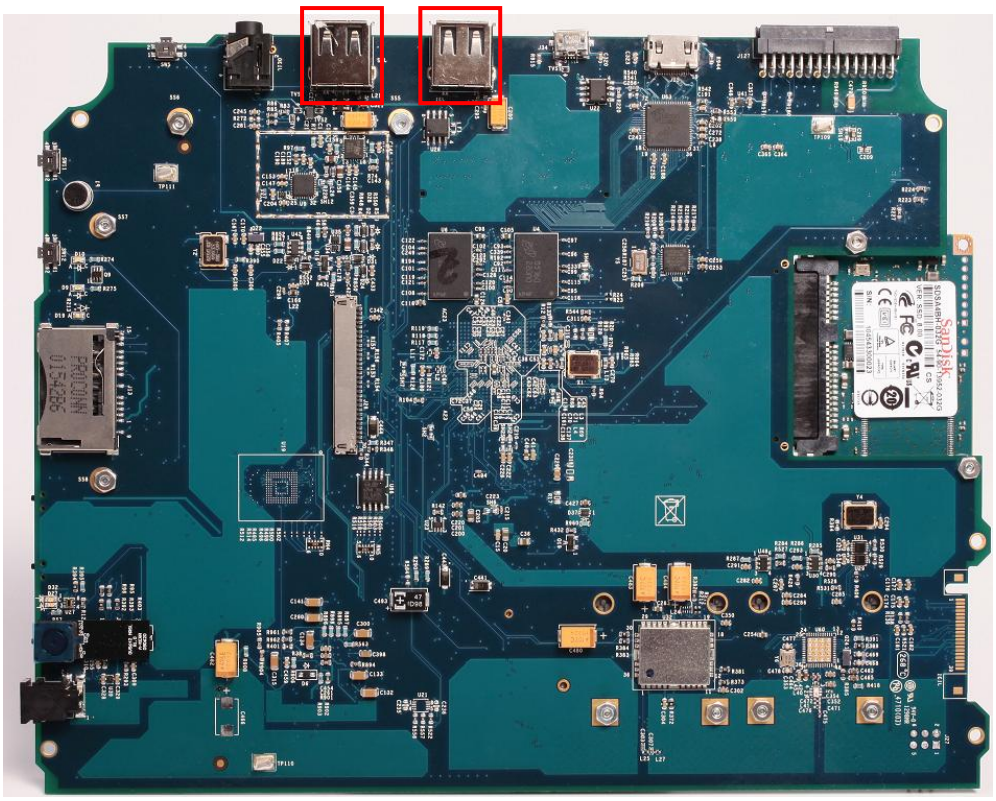

Figure 4-4. Dual USB HOST Connector

4.5. Micro-B USB Device Connector (J34)

The MCIMX53SMD board has one micro-B USB device connector that can be used to connect the MCIMX53SMD board to a USB Host computer. The micro-B connector is connected to the high-speed (HS) USB 2.0 OTG module of the i.MX53 processor. When a 5V supply is provided to the micro-B connector (from the USB Host), then, the i.MX53 processor will configure the OTG module for device mode. This will prevent the lower USB Host port from operating correctly. The 5V power provided by the attached USB Host is only used by the i.MX53 processor for sensing that the host is present. The MCIMX53SMD board will not draw power from the connected USB Host and will not operate without a 5V DC power source or charged Li-ION battery. The micro-B connector is keyed and will not accept a micro-A plug from a cable. A micro-B to USB-A cable is supplied as part of the MCIMX53SMD board kit and can be inserted into the micro-B USB connector at the point shown in **Figure 4-5**.

Micro-B USB Connector (J34)

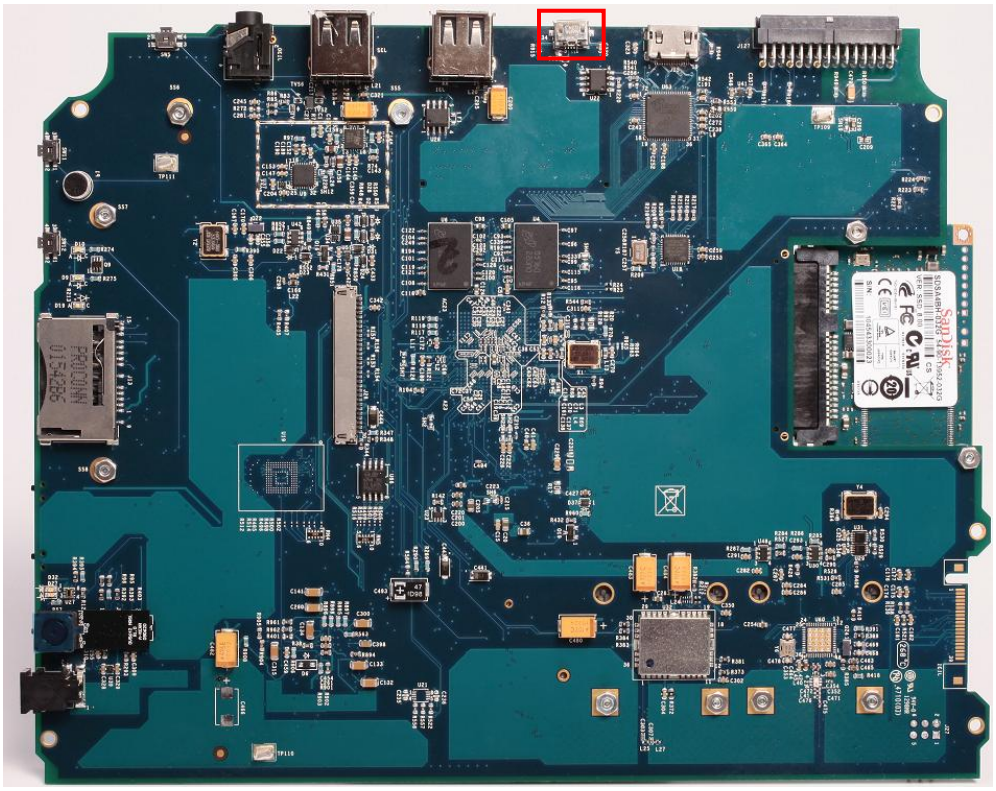

Figure 4-5. Micro-B USB Connector

4.6. Mini-HDMI Connector (J25)

The MCIMX53SMD board has one mini-HDMI connector that can be used to connect the MCIMX53SMD board to HDMI display. The mini-HDMI connector is connected to HDMI transceiver SiI9022. RGB signals and SPDIF are connected with the i.MX53 processor. A mini-HDMI cable is supplied as part of the MCIMX53SMD board kit and can be inserted into the mini-HDMI connector at the point shown in **Figure 4-6**.

Mini-HDMI Connector (J25)

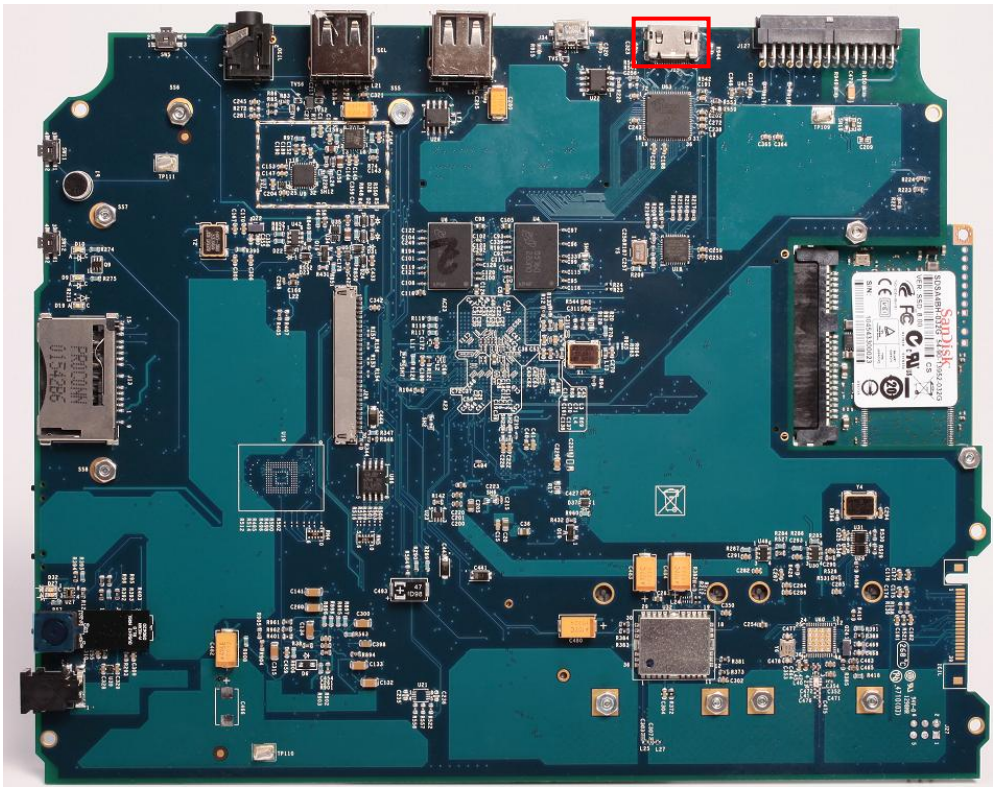

Figure 4-6. Mini-HDMI Connector

4.7. Debug Connector (J127)

The MCIMX53SMD board has one debug connector that can be used to connect the MCIMX53SMD board to the debug board. It includes JTAG, RS-232, and Ethernet. It is easy to use to debug the board for SW engineer. A debug board is supplied as part of the MCIMX53SMD board kit and can be inserted into the debug connector at the point shown in **Figure 4-7**.

A standard Cat-V Ethernet cable is attached to the debug board at the Ethernet. The connector allows the Ethernet IC to auto configure the port for the correct connection to either a switch or directly to a host PC on a peer-to-peer network. It is not necessary to use a crossover cable when connecting directly to another computer. A Cat-V Ethernet cable is supplied as part of the MCIMX53SMD board kit.

To connect a host PC to the MCIMX53SMD board to receive debugging information, a Null Modem serial cable is required and supplied with the MCIMX53SMD board kit. For newer generation computers that do not have a serial port, a USB-to-Serial cable can be used. There is no need for any special cabling to support debug information output.
The debug board contains a standard 20-pin ARM JTAG connector for advanced debugging with a third-party emulator. The header is configured to be used with 1.8V data signals. The developer should exercise caution when selecting the appropriate debugging tools. If an emulator set for 3.3V power and data is connected to the MCIMX53SMD board, the i.MX53 processor will be damaged.

Debug Connector (J127)

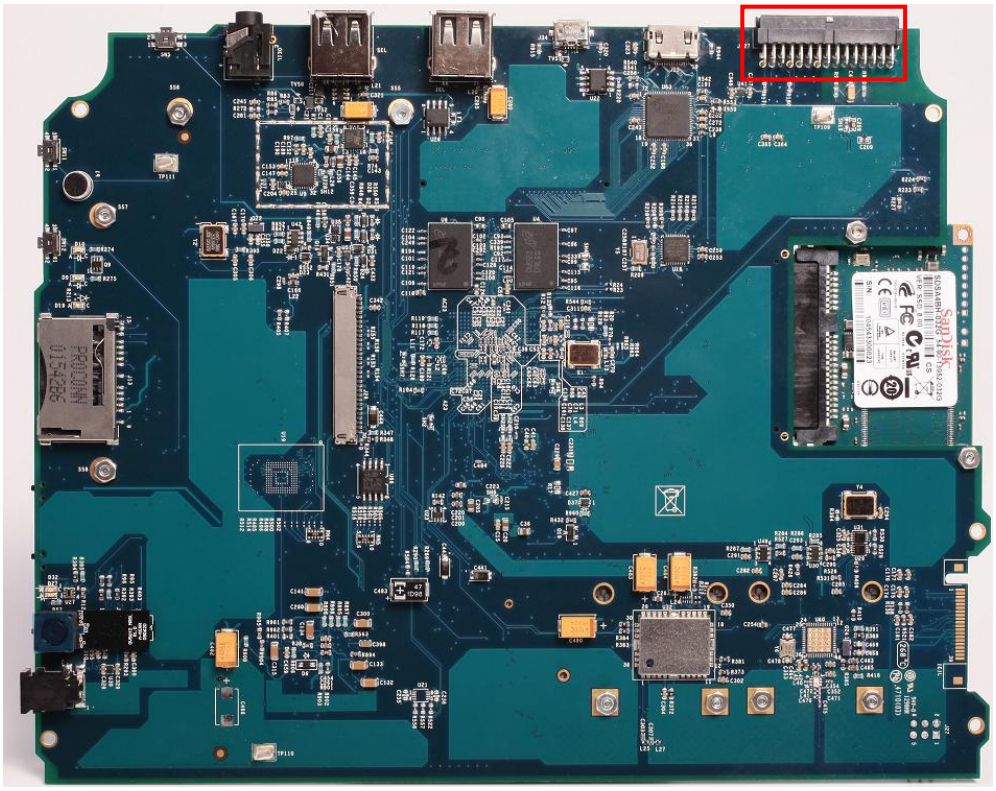

Figure 4-7. Debug Connector

4.8. SATA Connector (J5)

A SATA connector (J15) is provided on the MCIMX53SMD board and is connected to the SATA module of the i.MX53 processor. The MCIMX53SMD board is capable of communicating with any standard SATA device (SSD SATA in the MCIMX53SMD board kit). It is possible to initiate a boot from an attached SATA device. See the software reference manuals for instructions on how to configure the MCIMX53SMD board for SATA boot. The SSD SATA is plugged into the MCIMX53SMD board at the location shown in **Figure 4-8**.