User's Guide
SPRUIF8–June 2017

AM438x ePOS EVM Hardware

This document describes the hardware architecture of the AM438x evaluation module (EVM), part number TMDXEVM438x, which is based on the Texas Instruments AM438x processor. This EVM is also commonly known as the AM438x Electronic Point of Sale (ePOS) EVM.

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1 Description

The AM438x ePOS EVM is a stand-alone test, development, and evaluation module system that lets developers write software and develop hardware around an AM438x processor subsystem. The main elements of the AM438x subsystem are already available on the base board of the EVM. The base board gives developers the basic resources needed for most general-purpose type projects that encompass the AM438x as the main processor. Furthermore, additional, common peripherals, such as memory, sensors, LCD, Ethernet physical layer (PHY), and so on, are built into the EVM so that prospective systems can be modeled quickly without significant additional hardware resources.

The following sections give more details regarding the EVM.

2 System View

Figure 1 and Figure 2 show the system view of the AM438x ePOS EVM.

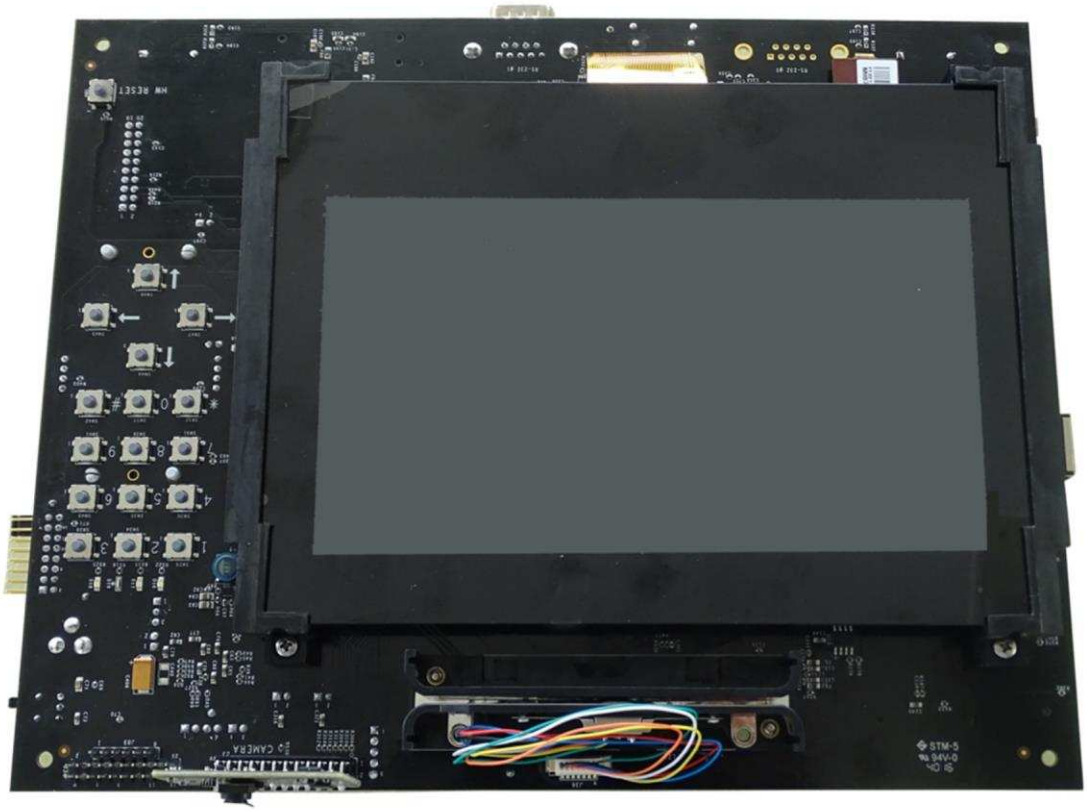

Figure 1. AM438x ePOS EVM Top View

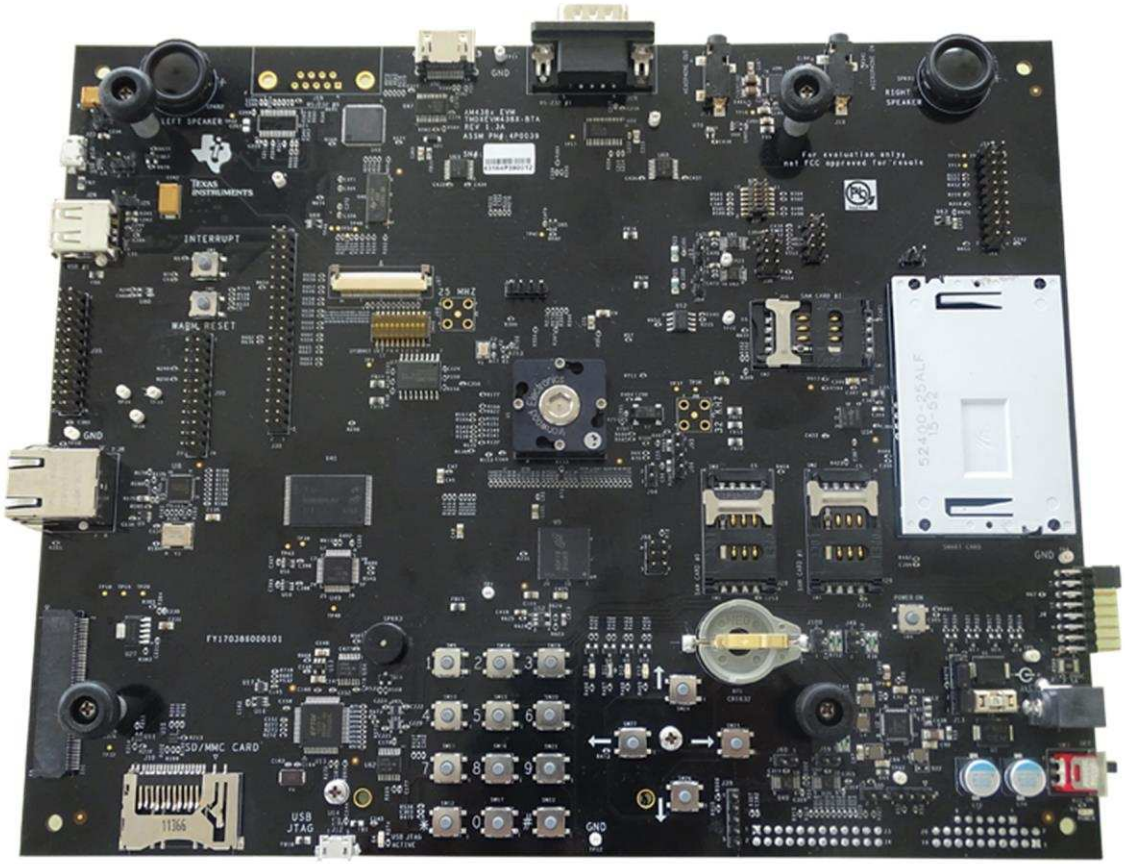

Figure 2. AM438x ePOS EVM Bottom View

3 Functional Blocks Description

The AM438x ePOS EVM has a camera board and/or wireless add-on boards. Figure 3 shows the block diagram of the ePOS EVM.

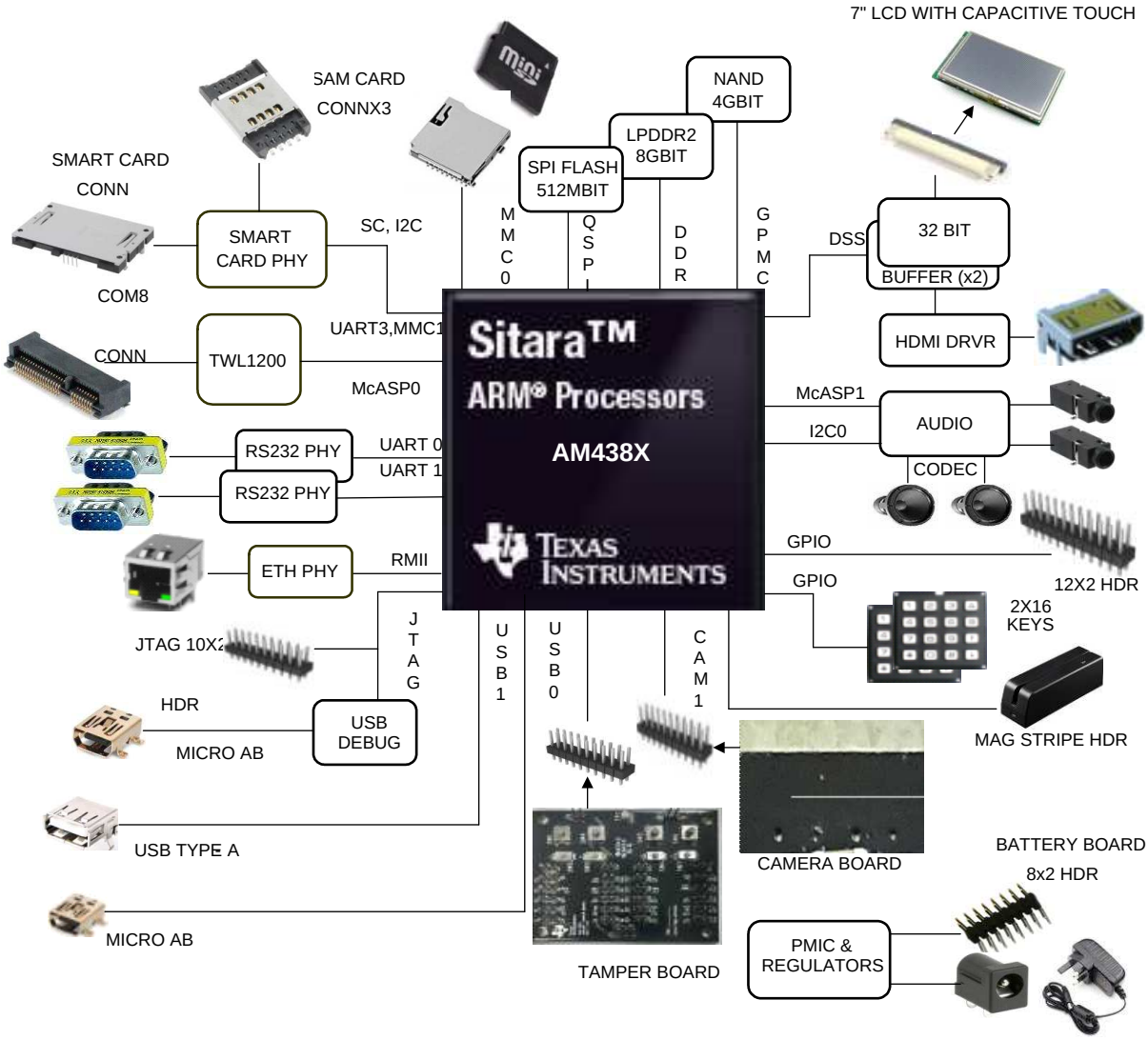

Figure 3. AM438x ePOS EVM Block Diagram

The following sections describe the major blocks of the ePOS EVM.

3.1 Processor

The AM438x processor is the central processor to this EVM. All the resources onboard surround the AM438x processor to provide development capabilities for hardware and software. See the AM438x data sheet and TRM for details about the processor.

System configuration signals (SYSBOOT0 to SYSBOOT18) on the EVM can be set using resistors and switches to define some start-up parameters on the AM438x processor. See Section 5 for more details.

3.2 Clocks

Several clocks in the EVM support the AM438x processor. The main clock for the processor is derived from a 25-MHz crystal. An onboard oscillator in the AM438x device generates the base clock and subsequent module clocks as needed within the AM438x processor. A 32-kHz clock for the real-time clock (RTC) on the AM438x device is derived from a 32.768-kHz crystal on the board.

The EVM also supports an option to connect an external clock using a subminiature version A (SMA) connector for both these clocks. However, hardware modifications are needed to isolate the onboard crystals and connect the external clock. See the schematics and TRM for details.

3.3 Reset Signals

Power-on reset to the processor is driven from the power good signal of the power manager and by a hard reset switch. Asserting this switch also activates the reset signal SYS_RESETn, which runs to several peripherals and the AM438x and resets those peripherals.

3.4 Memories Supported

3.4.1 LPDDR2 SDRAM

The AM438x ePOS EVM contains 8Gb (256M x 32, 2 dies) of LPDDR2 SDRAM memory from Micron®, which has dual dies. The part number for the LPDDR2 SDRAM memory device used is MT42L256M32D2LG-25. The package used is an 168-ball VFBGA package.

3.4.2 NAND Flash

The ePOS EVM has a NAND type of flash. The part number of the memory device used is MT29F4G08AB, which is a 4Gb (512M × 8) of flash memory. The GPMC signals are used to communicate with this memory.

3.4.3 QSPI Flash

A QSPI flash of 512Mb, part number MX66L51235FMI-10G, is used in this design. The QSPI flash boot is enabled through this flash. This flash is connected to the SPI0 port of the processor.

3.4.4 Board Identity Memory

Each board contains a serial EEPROM that contains board-specific data that lets the processor automatically detect which board is connected and the version of that board. Other hardware-specific data can be stored on this memory device as well. The part number of the memory device is CAT24C256WI-G. See Section 5 for details on the data in this memory.

3.5 SDMMC0

The SDMMC0 connector on the ePOS EVM is a microSD card socket, part number MHC-W21-601. This device is a standard SD/MMC card type of connector. The SDMMC0 connector is connected to the MMC0 port of the AM438x processor. Check the AM438x data sheet and TRM for supported card types and densities.

3.6 10/100 Ethernet

The AM438x ePOS EVM uses the 10/100 Ethernet transceiver (DP83848J) from TI, which is connected to the J8 RJ45 connector.

The reset on the transceiver is driven by the board system reset signal, SYS_RESETn, and the individual reset signal, ETHER_RESETn, that is controlled by the GPIO of the AM438x processor. A 50-MHz crystal oscillator drives the clock signal for the DP83848J device.

The PHY address is set to 0x10h.

3.7 USB

The AM438x ePOS EVM supports two USB ports. The USB ports are connected to a microAB connector and a standard type-A connector. The ESD device, TPD4S012, and common choke filter, ACM2012 (TDK), are used on the USB signals before they are connected to the AM438x pins. The ID pin of the microAB connector can be tied to ground through a J24 jumper to look like a B device.

3.8 Connectivity

The AM438x ePOS EVM supports MCS COM8 form factor wireless boards from TI through the J21 COM connector, which is a Samtec® card edge-type connector, part number MEC6-150-02-S-D-RA1. This connector supports COM8 boards; more details are in the MCS COM8 board documents.

The COM connector requires 3.6 V, 442 mA on the power supply. Therefore a TPS79501 LDO regulator is used to provide this voltage supply from the base 5.0-V supply.

The signals on the COM board are all 1.8-V voltage level. Therefore voltage translators are placed to convert to and from 3.3 V of the AM438x rail for a particular signal that is running at 3.3 V.

3.9 UART

This EVM supports two UART ports, UART0 and UART1. The UART0 port from the processor is converted to USB using the FT2232HL USB-to-UART bridge. UART1 is terminated on a DB9 connector using the MAX3243 RS-232 transceiver between the AM438x and the DB9 connector. UART0 can also be optionally terminated with a DB9 connector and a RS-232 transceiver. The RS-232 and DB9 connectors are unpopulated on the board.

3.10 ADC

The analog inputs to the AM438x device are terminated on the J36 connector, where a magnetic-stripe assembly must be connected.

3.11 Smart Card

There is a full smart card connector FCI, part number 52400-25ALF, on the EVM. There are also three SAM card sockets onboard. A TCA5013 Smartcard PHY controls these cards and is controlled by I2C2 from the AM438x.

The PHY I2C address is set to 0x3E.

3.12 Camera

Camera interface from the AM438x processor is terminated on the 12x2 header J15. The custom-made camera module from TI shall be interfaced with this header. This camera module is on a separate camera board that attaches at a right angle, so that the camera can face horizontally when the ePOS EVM is laying on a testbench.

The I2C address set to camera module is 0x30.

3.13 Audio

This EVM uses an audio codec from TI, part number TLV320AIC3111, for the audio input and output. This audio codec is connected through the McASP1 and I2C interfaces to the AM438x. The microphone is implemented as a 3.5-mm jack with stereo connection. Speaker out is implemented with integrated speakers. The PUI speakers are attached to the PCB and their solder lugs are connected to the throughhole connections for each speaker. The audio codec reset is driven by the board system reset, SYS_RESETn, and an individual reset signal that is controlled by a GPIO of the AM438x.

3.14 Printer Header

This EVM has a 2 × 12 header to connect to an external printer. The header connects several GPIOs, SPI buses, and PWM signals to control a printer.

3.15 Magnetic Stripe Reader

This EVM provides a 7-pin connector, part number 0533980771, to connect to the magnetic stripe reader. The magnetic stripe reader is connected to the ADC analog inputs 0 to 7 of the AM438x processor.

4 Power Supplies

This section describes how the power supplies required for the design are generated.

4.1 Power Source

The AM438x ePOS EVM uses an external AC to +5 VDC (rated 2.5 A minimum) power adapter. The switch near the power cable is used for powering on and off. The main power is on when the power switch is positioned away from the power supply jack. The main power is off when the power switch is positioned closest to the power supply jack.

4.2 Power Sequencing

The power sequencing requirements of the AM438X processor (see the AM438x data sheet) are automatically handled by the TPS65218 PMIC.

4.3 Power-Management IC Power Supplies

The AM438x ePOS EVM uses the TPS65218 power-management IC from TI. The I2C0 on the AM438x is used to control the SmartReflex™ port and control port on the TPS65218 device. For the AM438x processor, the following power supplies from the TPS65218 device are used (see Table 1).

Table 1. AM438x Power Supplies From TPS65218

TPS65218 Power Supply	AM438x Power Rail	Voltage (V)
VDCDC1	VDD_CORE	1.1 V
VDCDC2	VDD_MPU	1.1 V
VDCDC3	VDD2, VDDCA, VDDQ of LPDDR2	1.2 V
VLS1	VDD_DDR	1.2 V
V1_8D	VDDS_CLKOUT, VDDS_OSC, VDDS_SRAM_CORE_BG, VDDS_SRAM_MPU_BB VDDS_PLL_DDR, VDDS_PLL_MPU, VDDA1P8V_USB0, VDDA1P8V_USB1, VPP, VDDA_MC_ADC, VDDA_TS_ADC, VDDS_CTM, VDDS, VDDS_RTC, COM8, Tamper, and ADC input sections	1.8 V
V1_0BAT	VDD_TPM	1.0 V
V1_8BAT	VDDS_TPM	1.8 V
V3_3D_AM438X from TPS63031	VDDSHV 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	3.3 V
V5_0D	HDMI circuitry, USB0 power	5.0 V

Table 2. Other Power Supplies

Power Supply	Power Rail	Voltage (V)
V1_8LPDDR2 from TPS78101	VDD1 of LPDDR2	1.8 V
V3_3D	NAND memory, QPSI flash, Ethernet PHY, SDMMC0, board ID memory, ARM JTAG, buffers of FTDI section, LCD buffer, touchscreen, camera module, HDMI buffer, audio codec, RS-232 sections, COM8 sections, smart card sections, tamper header, platform test section, GPIO header, and printer	3.3 V
V3_3FTDI	FT2232 section from TPS79333	3.3 V
VBAT	LCD POWER generation, camera module, VCOM_BAT generation for COM8 module, USB1 power generation, platform test section, LEDs, GPIO header, buzzer, printer	xx V
V1_2D	HDMI section power	1.2 V

4.4 APM Sense Resistors

The AM438x ePOS EVM has the following subsystems with current sense resistors (see Table 3). These resistors allow measurement of power on each power rail, to check AM438x power requirements during real-time software execution. The value of the resistors is selected to provide the best dynamic range when using a TI INA226 converter. In fact, an INA226 converter is installed on the EVM for VDD_CORE, VDD_MPU, VAM438X_DDR, V1_8D_AM438X, V3_3D_AM438X, and VDDS_DDR power supply rails of the AM438x. Also, the measurement connections of all the sense resistors are attached to 2-pin standard headers so that they can be read easily by a multimeter or connected to an INA226 converter EVM.

The AM438x ePOS EVM has the option to access the INA devices through the onboard AM438X I2C0 port by closing jumpers J101 and J102. By default, the INA226 converter is connected to the 5-pin header J39. See the schematics for more details.

NOTE: The value of the sense resistors for VDD_CORE and VDD_MPU were selected to give better dynamic range for active power modes, rather than sleep or low power modes. If power is to be measured for VDD_CORE or VDD_MPU for sleep or low-power modes, then this sense resistor value must be changed to give better shunt voltage values.

Table 3. AM438x ePOS EVM APM Sense Resistors

Voltage Net	Sense Resistor Value
VDD_CORE	0.05 Ω
VDD_MPU	0.05 Ω
VAM438X_DDR	0.05 Ω
V1_8D_AM438X	0.05 Ω
V3_3D_AM438X	0.1 Ω
VDDS_DDR	0.05 Ω

5 Configuration and Setup

5.1 Boot Configuration

SYSBOOT pins on the AM438x can be configured a certain way using a 10-bit DIP switch on the EVM. This SYSBOOT switch configures the AM438x to different settings. For instance, the boot method of the processor can be set up by configuring the DIP switch to particular settings. The SW48 DIP switch has the switches that set SYSBOOT[0...4, 6, 7, 17, 18]. Other SYSBOOT pin settings are done through resistors pulled either high or low. See the AM438x TRM and data sheet for the actual definitions of each SYSBOOT signal. Table 4 provides the mapping of the boot strap pin and the corresponding switch bits.

Table 4. SYSBOOT DIP Switches

DIP Switch Bits (SW48)	Boot Strap
Bit 1	SYSBOOT18
Bit 2	SYSBOOT17
Bit 3	SYSBOOT7
Bit 4	SYSBOOT6
Bit 5	SYSBOOT4
Bit 6	SYSBOOT3
Bit 7	SYSBOOT2
Bit 8	SYSBOOT1
Bit 9	SYSBOOT0
Bit 10	NC (not connected)

When the DIP switch is on, then the corresponding SYSBOOT signal is pulled high. When the DIP switch is off, then the corresponding SYSBOOT signal is pulled low. See the ePOS EVM schematic for more details.

5.2 I2C Address Assignments

See the first page of the schematic for I2C device addresses.

5.3 I2C ID Memory

The ePOS EVM has a dedicated I2C EEPROM that contains specific identity and configuration information for that board (see Table 5). In addition, there is available space in each memory for user-specific configuration information. The part number of the memory device is CAT24C256WI-G.

Table 5. AM438x ePOS EVM EEPROM Data

Name	Size (bytes)	Contents
Header	4	MSB 0xEE3355AA LSB
Board name	8	Name for board in ASCII "A33515BB" = AM438x ePOS EVM
Version	4	Hardware version code for board in ASCII "1.4A" = rev. 01.4A
Serial number	12	Serial number of the board. This is a 12-character string: WWYY4P16nnnn, where: • WW = 2-digit week of the year of production • YY = 2-digit year of production • nnnn = incrementing board number
Configuration	32	Codes to show the configuration setup on this board. For the available EVMs supported, the following codes are used: • ASCII "SKU#01" = base board for general purpose EVM • ASCII "SKU#02" = base board for industrial motor control EVM • Remaining 26 bytes are reserved
Ethernet MAC address #0	6	MAC address for AM438x Ethernet MAC #1
Ethernet MAC address #1	6	MAC address for AM438x Ethernet MAC #2 or PRU #0
Ethernet MAC address #2	6	MAC address for AM438x PRU #1 (if used)
Available	32702	Available space for other nonvolatile codes and data

5.4 JTAG

The AM438x ePOS EVM supports embedded XDS100V2 USB emulation using the microAB connector. One of the FT2232 ports is used to covert these JTAG signals to USB and the other port is used for UART signals. The ePOS EVM also has an optional 20-pin CJTAG connector from TI, to support the emulation. Other JTAG adapters are available on TI's website and can be purchased here.

6 User Interfaces

6.1 Keypad

The keypad has 4 × 4 push-button switches with Omron part number B3SL-1022P. The keypad is replicated on the top and bottom of the board to allow the LCD to be swung out for hardware debugging of the main components, or for the LCD to be mounted to the board for software debugging only. This keypad uses 4 power lines and 4 scan lines to enable monitoring of 16 buttons. The buttons are arranged mechanically as a standard 3 × 4 telephone dial pad and four arrow cursor directional buttons.

6.2 LEDs

There are four LEDs: red, yellow, green, and blue colors, on the top and bottom sides of the EVM. A green power-on indication LED (D3) is available in the EVM.

6.3 Audio Buzzer

An audio buzzer is installed on the board to provide auditory cues to the user. This audio buzzer PUI audio part number AI-1027-TWT-3V-R is driven from a GPIO.

6.4 Display

This EVM supports either LCD or HDMI display options. The AM438x DSS (display subsystem) signals are connected to the LCD or HDMI display through the 32-bit, buffer/driver SN74LVC32244ZKE from TI. The selection between LCD and HDMI is controlled by a GPIO of the AM438x.

6.4.1 HDMI

A Silicon Image SIL9022A HDMI transmitter converts the DSS signals to HDMI. The HDMI signals are terminated at the HDMI connector-J32, part number 10029449-001RLF. SIL9022A is controlled by I2C2 from the AM438x. The HDMI reset is driven by the board system reset SYS_RESETn and an individual reset signal that is controlled by a GPIO of the AM438x. For more details see the schematics.

The I2C Address of SIL9022A is 0X3B.

6.4.2 LCD and Touchscreen

The LCD signals are terminated at the 50-pin FPC connector (J44), part number FH12S-50S-0.5SH. The LCD that mates with this connector is a 7-inch, WVGA (800 × 480) 24-bit, RGB, TFT LCD panel, part number OSD070T1718-19TS. The connector supports 27 white LEDs for backlight (controlled by one power regulator). The LED backlight on the LCD is controlled by a TPS61081 PWM controlled LED driver. The LCD has a capacitive touchscreen that is connected to the I2C0 port of the processor. The required power for the LCD is generated using the TPS65105 linear regulator supply.

The I2C address of the touchscreen is 0X5C.

7 Pin Use Description

7.1 Functional Interface Mapping

A pinmux configuration file is provided to show how each pin on the AM438x is configured on the EVM. Most interfaces on the EVM are fixed to certain functions. See the AM438x data sheet to determine other possible pin MUX configurations, to enable different functionalities for signals that are not fixed to certain function board connectors.

8 Board Connectors

The pinout details of all the connectors used in the ePOS EVM are provided in the following sections.

8.1 SDMMC0 – J10

Table 6 lists the pin details of the AM438x SDMMC0 connector.

Table 6. AM438x SDMMC0 Connector Pin Details

Pin No.	Signal
MMC plus, MMC mobile, MMC, RS-MMC, SD#1	MMC0_D3
MMC plus, MMC mobile, MMC, RS-MMC, SD#2	MMC0_CMD
MMC plus, MMC mobile, MMC, RS-MMC, SD#3	GND
MMC plus, MMC mobile, MMC, RS-MMC, SD#4	VCC
MMC plus, MMC mobile, MMC, RS-MMC, SD#5	MMC0_CLK
MMC plus, MMC mobile, MMC, RS-MMC, SD#6	GND
MMC plus, MMC mobile, MMC, RS-MMC, SD#7	MMC0_D0
MMC plus, MMC mobile, SD#8	MMC0_D1
MMC plus, MMC mobile, SD#9	MMC0_D2
MMC plus, MMC mobile#10	NC
MMC plus, MMC mobile#11	NC
MMC plus, MMC mobile#12	NC
MMC plus, MMC mobile#13	NC
miniSD#1	MMC0_D3
miniSD#2	MMC0_CMD
miniSD#3	GND
miniSD#4	VCC
miniSD#5	MMC0_CLK
miniSD#6	GND
miniSD#7	MMC0_D0
miniSD#8	MMC0_D1
miniSD#9	MMC0_D2
miniSD#10	NC
miniSD#11	NC

8.2 LCD Connector – J44

Table 7 lists the pin details of the LCD connector.

Table 7. AM438x LCD Connector Pin Details

Pin No.	Signal	Description
1	VLED+	Backlight power +
2	VLED+	Backlight power +
3	VLED-	Backlight power –
4	VLED-	Backlight power –
5	GND	Ground
6	VLCD_VCOM	Voltage
7	VLCD_DVDD	Voltage
8	GND	Ground
9	LCD_EN	LCD enable
10	LCD_VSYNC	LCD vertical sync

Table 7. AM438x LCD Connector Pin Details (continued)

Pin No.	Signal	Description
11	LCD_HSYNC	LCD horizontal sync
12	LCD_BLUE7	LCD blue data 7
13	LCD_BLUE6	LCD blue data 6
14	LCD_BLUE5	LCD blue data 5
15	LCD_BLUE4	LCD blue data 4
16	LCD_BLUE3	LCD blue data 3
17	LCD_BLUE2	LCD blue data 2
18	LCD_BLUE1	LCD blue data 1
19	LCD_BLUE0	LCD blue data 0
20	LCD_GREEN7	LCD green data 7
21	LCD_GREEN6	LCD green data 6
22	LCD_GREEN5	LCD green data 5
23	LCD_GREEN4	LCD green data 4
24	LCD_GREEN3	LCD green data 3
25	LCD_GREEN2	LCD green data 2
26	LCD_GREEN1	LCD green data 1
27	LCD_GREEN0	LCD green data 0
28	LCD_RED7	LCD red data 7
29	LCD_RED6	LCD red data 6
30	LCD_RED5	LCD red data 5
31	LCD_RED4	LCD red data 4
32	LCD_RED3	LCD red data 3
33	LCD_RED2	LCD red data 2
34	LCD_RED1	LCD red data 1
35	LCD_RED0	LCD red data 0
36	GND	Ground
37	LCD_PCLK	Clock
38	GND	Ground
39	LCD_LEFTRIGHT	Left-right scan direction select
40	LCD_UPDOWN	Up-down scan direction select
41	VLCD_VGH	Voltage high
42	VLCD_VGL	Voltage low
43	VLCD_AVDD	Voltage analog
44	LCD_RESETn	Reset
45	NC	NC
46	VLCD_VCOM	Voltage
47	LCD_DITHER	Dither
48	GND	Ground
49	NC	NC
50	NC	NC

8.3 Touch Connector – J45

Table 8 lists the pin details of the LCD capacitive touchscreen connector.

Table 8. LCD Capacitive Touchscreen Pin Details

Pin No.	Direction	Description
1	NC	NC
2	NC	NC
3	TSC_INTn	Touchscreen interrupt
4	GP_I2C_SDA	I^2C data
5	GP_I2C_SCK	I^2C clock
6	SYS_RESETn	Reset
7	GND	Ground
8	VCC	Power

8.4 Ethernet – J8

Table 9 lists the pin details of the AM438x 10/100 Ethernet connector.

Table 9. AM438x 10/100 Ethernet Pin Details

Pin No.	Signal Name	Description
1	ETHER1_RDP	Data 1 RX positive
2	ETHER1_RDN	Data 1 RX negative
3	VCC	Voltage
4	VCC	Voltage
5	ETHER1_TDP	Data 1 TX positive
6	ETHER1_TDP	Data 1 TX negative
7	NC	NC
8	DGND	Ground
D1	LINK LED ANODE	Anode of link LED
D2	LINK LED CATHODE	Cathode of link LED
D3	SPEED LED ANODE	Anode of speed LED
D4	SPEED LED CATHODE	Cathode of speed LED
SHLD1	DGND	Ground
SHLD2	DGND	Ground

8.5 USB

8.5.1 Micro AB Connector – J23

Table 10 lists pin details of the AM438x micro AB connector.

Table 10. AM438x Micro AB Connector – USB Port 0 Pin Details

Pin No.	Signal Name	Description
1	VUSB_VBUS0	USB0 bus voltage
2	USB0_CONN_DM	USB0 data minus
3	USB0_CONN_DP	USB0 data plus
4	USB0_ID	USB0 identification
5	DGND	Ground

8.5.2 Type A Connector – J26

Table 11 lists pin details of the AM438x type A connector.

Table 11. AM438x Type A Connector – USB Port 1 Pin Details

Pin No.	Signal Name	Description
1	VUSB_VBUS1	USB1 bus voltage
2	USB1_CONN_DM	USB1 data minus
3	USB1_CONN_DP	USB1 data plus
4	DGND	Ground

8.6 Camera Interface Header – J15

Table 12 lists the pin details of the camera interface header connector.

Table 12. Camera Interface Header Pin Details

Pin No.	Signal Name	Description
1	VBAT	Power supply VBAT
2	CAM1_VSYNC	Vertical sync
3	CAM1_DATA0	Data 1
4	CAM1_HSYNC	Horizontal sync
5	CAM1_DATA1	Data 1
6	CAM1_DATA6	Data 6
7	CAM1_DATA2	Data 2
8	CAM1_DATA7	Data 7
9	CAM1_PCLK	Clock
10	CAM1_DATA8	Data 8
11	GND	Ground
12	GND	Ground
13	CAM1_DATA3	Data 3
14	CAM1_DATA9	Data 9
15	CAM1_DATA4	Data 4
16	CAM1_GIO0	GPIO 0
17	CAM1_DATA5	Data 5
18	CAM1_BUF_EN	Buffer enable
19	CAM1_WEN	Write enable
20	CAM1_FIELD	Field
21	GND	Ground
22	CAM1_I2C_SCL	I^2C clock
23	CAM1_SRCCLK	Clock
24	CAM1_I2C_DTA	I^2C data

8.7 HDMI Header Connector – J32

Table 13 lists the pin details of the HDMI header connecter.

Table 13. HDMI Header Pin Details

Pin No.	Signal Name	Description
1	HDMI_TX2+	Data Transmit2 +ve
2	DAT2_S	Data 2 GND
3	HDMI_TX2-	Data Transmit2 -ve
4	HDMI_TX1+	Data Transmit1 +ve
5	DAT1_S	Data 1 GND
6	HDMI_TX1-	Data Transmit1 -ve
7	HDMI_TX0+	Data Transmit0 +ve
8	DAT0_S	Data 0 GND
9	HDMI_TX0-	Data Transmit0 -ve
10	CLK+	Clock +ve
11	Clock_S	Clock GND
12	Clock-	Clock -ve
13	HDMICONN_CEC	CEC
14	NC	NC
15	HDMICONN_I2CSCL	I^2C clock
16	HDMICONN_I2CSDA	I^2C data
17	GND	Ground
18	V5_0HDMICONN	Voltage
19	HDMICONN_HPLG	HPLG

8.8 RS-232 Connectors

8.8.1 RS-232 Connector 1 – J19

Table 14 lists the pin details of RS-232 connector 1 (not mounted).

Table 14. RS-232 Connector 1 Pin Details

Pin No.	Signal Name	Description
1	NC	NC
2	RS232_0_RXD	Receive
3	RS232_0_TXD	Transmit
4	NC	NC
5	GND	Ground
6	NC	NC
7	RS232_0_RTS	Request to send
8	RS232_0_CTS	Clear to send
9	NC	NC

8.8.2 RS-232 Connector 2 – J20

Table 15 lists the pin details of RS-232 connector 2.

Table 15. RS-232 Connector 2 Pin Details

Pin No.	Signal Name	Description
1	RS232_1_DCD	Data carrier detect
2	RS232_1_RXD	Receive
3	RS232_1_TXD	Transmit
4	RS232_1_DTR	Data terminal ready
5	GND	Ground
6	RS232_1_DSR	Data set ready
7	RS232_1_RTS	Request to send
8	RS232_1_CTS	Clear to send
9	RS232_1_RI	Ring indicator

8.9 Smart Card Connector – J27

Table 16 lists the pin details of the smart card connector.

Table 16. Smart Card Connector Pin Details

Pin Name	Signal Name	Description
Sensor1	SMRTCRD1_PRES	Smart card present
Sensor2	V3_3D	Voltage 3.3 V
T1	VCC_SC1	Voltage
T2	SMRTCRD1_RST	Reset
T3	SMRTCRD1_CLK	Clock
T4	SMRTCRD1_C4	Auxillary I/O
T5	GND	Ground
T6	VCC_SC1	Voltage
T7	SMRTCRD1_IO	I/O
T8	SMRTCRD1_C8	Auxillary I/O

8.10 SAM Card Connector – J28, J29, and J58

Three SAM card connectors are used in this ePOS EVM design. Table 17 lists the pinout details of the SAM card connector.

Table 17. SAM Card Connector Pin Details

Pin Name	Signal Name	Description
C1	VCC_SC2	Voltage
C2	SAMCRD_RST	Smart card reset
C3	SAMCRD_CLK	Smart card clock
C5	GND	Ground
C6	VCC_SC2	Voltage
C7	SAMCRD_IO	I/O
SW1	NC	NC
SW2	NC	NC

8.11 Tamper Header – J34

Table 18 lists the pin details of the tamper header.

Table 18. Tamper Header Pin Details

Pin No.	Signal Name	Description
1	V1_8BAT	Voltage 1.8 V
2	V3_3D	Voltage 3.3 V
3	GND	Reserved
4	RESERVED5	Tamper event signal
5	TM_PIO_0	I/O 0
6	TM_PIO_1	I/O 1
7	TM_PIO_2	I/O 2
8	TM_PIO_3	I/O 3
9	RESERVED1	Reserved
10	TPMSS_OUT	TPMSS_out signal
11	TM_PIO_8	I/O 8
12	TM_PIO_9	I/O 9
13	TM_PIO_10	I/O 10
14	TM_PIO_11	I/O 11
15	RESERVED3	Reserved
16	RESERVED4	Reserved
17	NC	NC
18	NC	NC
19	RTC_ALARM	RTC alarm
20	GND	Ground

8.12 Platform Test Header – J35

Table 19 lists the pin details of the platform test header.

Table 19. Platform Test Header Pin Details

Pin No.	Signal Name	Description
1	VBAT	Voltage V_{BAT}
2	DGND	Digital ground
3	VBAT	Voltage V_{BAT}
4	DGND	Digital ground
5	V3_3D	Voltage 3.3 V
6	DGND	Digital ground
7	GPIO5_4	GPIO
8	GPIO5_9	GPIO
9	DGND	Digital ground
10	GPIO5_10	GPIO
11	GPIO5_6	GPIO
12	DGND	Digital ground
13	GPIO5_7	GPIO
14	GPIO5_11	GPIO
15	DGND	Digital ground
16	GPIO5_12	GPIO
17	GPIO5_8	GPIO
18	GPIO5_5	GPIO
19	GPIO5_13	GPIO
20	AM438X_AIN5	Analog input 5
21	GNDA_ADC	Analog ground
22	AM438X_AIN4	Analog input 4
23	VDDA_ADC	Voltage ADC
24	AM438X_AIN3	Analog input 3

8.13 Magnetic Stripe Reader Header – J36

Table 20 lists the pin details of the magnetic stripe reader header.

Table 20. Magnetic Stripe Reader Header Pin Details

Pin No.	Signal Name	Description
1	AM438X_MAGAIN0	Magnetic-stripe reader analog input 0
2	AM438X_MAGAIN1	Magnetic-stripe reader analog input 1
3	AM438X_MAGAIN2	Magnetic-stripe reader analog input 2
4	AM438X_MAGAIN3	Magnetic-stripe reader analog input 3
5	AM438X_MAGAIN4	Magnetic-stripe reader analog input 4
6	AM438X_MAGAIN5	Magnetic-stripe reader analog input 5
7	GNDA_MAG	Analog ground

8.14 ADC Input Header – J37

Table 21 lists the pin details of the ADC input header.

Table 21. ADC Input Header Pin Details

Pin No.	Signal Name	Description
1	MON_AIN0	Monitoring analog input 0
2	MON_AIN4	Monitoring analog input 4
3	MON_AIN1	Monitoring analog input 1
4	MON_AIN5	Monitoring analog input 5
5	GND_ADC	Analog ground
6	V1_8D	Voltage 1.8 V
7	MON_AIN2	Monitoring analog input 2
8	MON_AIN6	Monitoring analog input 6
9	MON_AIN3	Monitoring analog input 3
10	MON_AIN7	Monitoring analog input 7
11	GND_ADC	Analog ground
12	GND_ADC	Analog ground

8.15 GPIO Header – J38

Table 22 lists the pin details of the GPIO header.

Table 22. GPIO Header Pin Details

Pin No.	Signal Name	Description
1	V3_3D	Voltage 3.3 V
2	VBAT	Voltage V_{BAT}
3	GPIO0	General-purpose I/O 0
4	NC	NC
5	GPIO1	General-purpose I/O 1
6	NC	NC
7	GPIO2	General-purpose I/O 2
8	NC	NC
9	GPIO3	General-purpose I/O 3
10	NC	NC
11	GPIO4	General-purpose I/O 4
12	NC	NC
13	GPIO5	General-purpose I/O 5
14	NC	NC
15	GPIO6	General-purpose I/O 6
16	NC	NC
17	GPIO7	General-purpose I/O 7
18	NC	NC
19	GPIO8	General-purpose I/O 8
20	NC	NC
21	GPIO9	General-purpose I/O 9
22	NC	NC
23	GPIO10	General-purpose I/O 10
24	NC	NC
25	GPIO11	General-purpose I/O 11
26	NC	NC
27	GPIO12	General-purpose I/O 12
28	NC	NC
29	GPIO13	General-purpose I/O 13
30	NC	NC
31	GPIO14	General-purpose I/O 14
32	NC	NC
33	GPIO15	General-purpose I/O 15
34	NC	NC
35	GPIO16	General-purpose I/O 16
36	NC	NC
37	GPIO17	General-purpose I/O 17
38	NC	NC
39	DGND	Ground
40	DGND	Ground

8.16 Printer Header – J90

Table 23 lists the pin details of the printer header.

Table 23. Printer Header Pin Details

Pin No.	Signal Name	Description
1	VBAT	Voltage V_{BAT}
2	V3_3D	Voltage 3.3 V
3	VBAT	Voltage V_{BAT}
4	eHRPWM0_A	PWM signal 0 – A
5	PRINTER_GPIO3	General-purpose I/O 3
6	eHRPWM0_B	PWM signal 0 – B
7	PRINTER_GPIO2	General-purpose I/O 2
8	eHRPWM0_TRIPZONE	PWM signal 0 Trip Zone
9	PRINTER_GPIO1	General-purpose I/O 1
10	eHRPWM0_SYNCI	PWM 0 Sync
11	PRINTER_GPIO0	General-purpose I/O 0
12	eHRPWM1_A	PWM 1 – A
13	DGND	Ground
14	eHRPWM1_B	PWM 1 – B
15	PRINT_SPI_CLK	SPI clock
16	DGND	Ground
17	PRINT_SPI_CSn	SPI chip select
18	NC	NC
19	PRINT_SPI_MOSI	SPI master out slave in
20	NC	NC
21	PRINT_SPI_MISO	SPI master in slave out
22	NC	NC
23	DGND	Ground
24	NC	NC

8.17 SPI Headers

8.17.1 SPI Header 1 – J31

Table 24 lists the pin details of SPI header 1.

Table 24. SPI - Header 1 Pin Details

Pin No.	Signal Name	Description
1	V3_3D	3.3-V supply
2	DGND	Ground
3	AM438X_SPI0_SCLK	SPI0 clock
4	AM438X_SPI0_DIN	SPI0 data in
5	AM438X_SPI0_DOUT	SPI0 data out
6	AM438X_SPI0_CS0	SPI0 chip select
7	DGND	Ground
8	NC	NC

8.17.2 SPI Header 2 – J30

Table 25 lists the pin details of SPI header 2.

Table 25. SPI - Header 2 Pin Details

Pin No.	Signal Name	Description
1	V3_3D	3.3-V supply
2	DGND	Ground
3	AM438X_SPI1_SCLK	SPI1 clock
4	AM438X_SPI1_D1	SPI1 D1
5	AM438X_SPI1_D0	SPI1_D0
6	AM438X_SPI1_CS0n	SPI1 chip select
7	DGND	Ground
8	AM438X_STATUS_LED1	Status LED1

8.18 I2C Header – J39

Table 26 lists the pin details of the I2C header.

Table 26. I2C - Header Pin Details

Pin No.	Signal Name	Description
1	PWRMON_I2CSCL	I^2C clock
2	PWRMON_I2CSDA	I^2C data
3	DGND	Ground
4	PM_ALERT	Alert
5	NC	NC

8.19 Automation Header – J97

Table 27 lists the pin details of the automation header.

Table 27. Automation - Header Pin Details

Pin No.	Signal Name	Description
1	V3_3D	Voltage 3.3 V
2	V3_3D	Voltage 3.3 V
3	V3_3D	Voltage 3.3 V
4	NC	NC
5	NC	NC
6	NC	NC
7	DGND	Ground
8	SYSBOOT0	Boot strap bit 0
9	SYSBOOT1	Boot strap bit 1
10	SYSBOOT2	Boot strap bit 2
11	SYSBOOT3	Boot strap bit 3
12	SYSBOOT4	Boot strap bit 4
13	SYSBOOT6	Boot strap bit 6
14	SYSBOOT7	Boot strap bit 7
15	SYSBOOT17	Boot strap bit 17
16	DGND	Ground
17	SYSBOOT18	Boot strap bit 18
18	NC	NC
19	NC	NC
20	NC	NC
21	NC	NC
22	NC	NC
23	NC	NC
24	NC	NC
25	DGND	Ground
26	NC	NC
27	TEST_PORZn	Reset signal
28	NC	NC
29	TEST_WARMRESETn	Reset signal
30	NC	NC
31	NC	NC
32	TEST_GPIO17	GPIO
33	NC	NC
34	DGND	Ground
35	NC	NC
36	PWRMON_I2CSCL	Power monitor I^2C clock
37	NC	NC
38	PWRMON_I2CSDA	Power monitor I^2C data
39	NC	NC
40	DGND	Ground

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