SoM-112ES

User Manual

August 2021

Revision 1.20

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1 Introduction

This document provides information regarding EMAC's SoM-112ES System-on-Module Carrier Board. The SoM-112ES is a compact, low-power SoM Carrier/Socket board with WiFi and Bluetooth connectivity onboard, and MikroBus expansion. This versatile SoM Carrier/Socket board is ideal for evaluation and early development work. This Carrier is designed to work with all EMAC 144-pin SODIMM type SoMs. Note: The SoM-112ES is specifically designed for SoMs with APM sleep capability and utilizes GPIO controllable IO to further reduce sleep current draws. There is a test point (TP1) on the carrier that allows measuring the current drawn by the SoM in various sleep modes.

The SoM-112ES provides access to many of the SoM's I/O through on-board connectors as well as a number of additional I/O expansion blocks such as Wireless Networking, 10/100 BaseT Ethernet, MikroBUS modules, and HCSD/MMC flash disk.

When paired with the SOM-IMX6U, the SOM-112ES makes a relatively Low Power IoT connectivity solution, using a MikroBUS ZigBee Wireless module, the SOM-112ES can collect and route IoT sensors to the Cloud.

1.1 Features

- **114 Pin SODIMM SoM Connector**
- **2x serial RS232 ports, 1x USB to Serial Console, & 1x RS232/422/485 Port**
- **3x USB Host ports & 1x USB Device Port**
- **1x 10/100 BaseT Ethernet with onboard Magnetics and RJ45**
- **Wifi/BT & CAN 2.0B Port**
- **General SOM I/O: GPIOs, SPI, A/D, D/A, PWM, I^2C, I^2S**
- **MikroBus Expansion**
- **Barrel power jack**
- **Standard Molex male floppy power connector for alternate power input**
- **DB9 male for COM C**
- **3x 10 pin header for serial ports**
- **1x micro USB connector for serial console**
- **1x dual USB Type A connector**
- **1x single USB Type A connector**
- **1x mini USB Device Type B connector**
- **1x RJ45 Ethernet connector**
- **1x Micro SD Card Socket**
- **1x 3-pin polarized locking connector for CAN**
- **1x dual row 50-pin .1" GPIO/Misc. Header connector**
- **1x I^2S audio with Line in & out jacks**
- **Reset Button**
- **SoM current measurement test point (for measurement with a voltmeter).**

2 Hardware

2.1 Specifications

- **Flash Disk:** Micro SD Card Socket
- **System Reset:** External Reset Button
- **RTC:** Real-Time Clock with battery-backed provision
- **Multi I/O: (any mix of)**
  - Up to 8x General Purpose Digital Inputs
  - Up to 8x General Purpose Digital Outputs
  - Up to 8x 12-bit Digital-to-Analog Converter (DAC)
  - Up to 8-channel, 12-bit Analog-to-Digital Converter (ADC)
- **Power:** Barrel Jack or Standard 4-Pin Molex Male Connectors with 3.3 linear regulator

Serial Interfaces:

- **UARTS:** 4x Serial Ports (2xRS232, 1xRS232/422/485, 1x USB Device to Serial Console)
- **Audio:** 1x I²S audio with Line in & out jacks
- **USB:** 3x USB Host ports & 1x USB Device Port

Ethernet Interface:

- **Type:** 10/100 BaseT Ethernet with onboard Magnetics and RJ45
- **Interface:** On-Board RJ-45 Connector

Bus Interface:

- **SoM Bus:** 144-Pin SODIMM SOM Module
- **Bus Expansion.:** MikroBUS Expansion Socket (MikroBUS module Optional)

Mechanical and Environmental

- **Dimensions:** 3" W × 4 .813" L × 0.75" H (76mm × 120mm × 19mm)
- **Power Supply Voltage:** +5 V power input
  - **Power Requirements (typical):** 5 Volts @ ~500mA (2.5 watts)
- **Operating Temperature:** 0 to 70° C (32 ~158° F) [-40 to +85° C optional]
- **Operating Humidity:** 0% ~ 90% relative humidity, non-condensing

2.2 Jumper Configuration & Connector Descriptions

The SoM-112ES is factory configured. In the event that jumpers need to be verified or modified this section provides the information required, including instructions on setting jumpers and connecting peripherals, switches and indicators. Be sure to read all the safety precautions before you begin any configuration procedure. See Appendix A for connector pinouts and Appendix B for Jumper Settings.

Table 1: Connectors

Label	Function
CN1	4-Pin Molex Male Floppy Power Connector
CN2	3-Pin Polarized Locking CAN Connector
HDR1	Utility GPIO Header
HDR2	RS-232 Serial Port COM A Header
HDR3	RS-232/422/485 Serial Port COM B Header
JK1	Audio Input Jack
JK2	Audio Output Jack
JK3	Serial Port COM C
JK4	Micro USB 2.0 Console Interface Connector
JK5	USB Host Port B
JK6	USB Host Port A1 & A2
JK7	USB Device Port C
JK8	Single Port Ethernet Connector
JK9	WiFi Antenna Connector
JK10	Vin Power Barrel Jack
SOK1	144 Pin SoM Socket
SOK2	MikroBUS Socket
SOK3	Micro SD Card Socket

Table 2: Jumpers

Label	Function	Default
JB1	Boot0 Source Selection	Position A
JB2	Boot1 Source Selection	Position A
JB3	Flash Write Protect	Position A
JB4	Standby Battery	ON
JB5	External SPI Interface Voltage	3.3V
JB6	External I2C Interface Voltage	3.3V
JB7	Serial Port RS-232 or RS-422/485	232
JB8	Serial Port RS-422 or RS-485	422
JB9	USB Device Port C Enable (for use with 2 USB Port SoMs)	No Jumper or Position A

2.3 Power Connectors

The SoM-112ES provides two power connectors. JK10 is a standard 5.5mm barrel jack with an inner diameter of 2.1mm with a center V+ connection and has an operating temperature of -25 ~ 85°C. This jack allows for an easy connection to a wall mount power supply (part# PJ-102A). The mating connector for PJ-102A is PP3-002AH. An alternative power connector is located at CN1 and is an On-Shore Technology locking power connector (part# 254B5V1040). This power input provides a more rugged/industrial locking connection with an operating temperature of -25 ~ 85°C. The mating connector for 254B5V1040 is 171822-4.

Table 3: Pin-out for Power Connector (CN1)

Pin	Signal
Pin 1	5V
Pin 2	GND
Pin 3	GND
Pin 4	12V

2.4 Ethernet

The SoM-112ES provides one 10/100 Base-T full duplex Ethernet and uses a standard single port RJ-45 LAN jack (JK8) with integrated magnetics. It can be connected straight to a hub, or another computer via Ethernet crossover cable. The Ethernet crossover cable can be replaced with a patch cable if the SoM processor module supports the Auto MDI-X capability. The Ethernet MAC & PHY are integrated into the SoM processor module. Activity and Link LEDs are integrated into the RJ45 connector.

2.5 Serial Ports

The SoM-112ES is equipped with four serial ports, two that terminate to 10-pin header connectors (COM A & B), one of which terminates to a male DB9 connector (COM C), and one USB to Serial console port that terminates to a micro USB 2.0 B connector (COM E). COM D is dedicated to the Bluetooth Radio. Baud Rates, stop bits, etc. are all programmable for each port via software.

- Serial Port COM A is a RS232 port. This port offers RXD/TXD without handshaking lines terminating to a 10-pin header.

Table 4: Serial Port COM A (HDR2)

Pin	RS-232 10-Pin Header: Description
1	NC
2	NC
3	COMA_RX232
4	NC
5	COMA_TX232
6	NC
7	NC
8	NC
9	GND
10	NC

- Serial Port COM B terminates to a 10-Pin header and can be configured as RS232, RS422, or RS485 via two jumpers (JB7 & JB8). To select RS232 set jumper JB7 to 232 (this is the default). For RS4xx set jumper JB7 to 4xx and jumper JB8 to 422 or 485 whichever is desired.

Table 5: Serial Port COM B (HDR3)

Pin	RS-232 10-Pin Header: Description	RS-422/485 10-Pin Header: Description
1	NC	COMB_422/485_TX-
2	NC	NC
3	COMB_232RX	COMB_422/485_TX+
4	COMB_232_RTS	NC
5	COMB_232TX	COMB_422/485_RX+
6	COMB_232_CTS	NC
7	NC	COMB_422/485_RX-
8	NC	NC
9	GND	GND
10	NC	NC

- Serial Port COM C terminates to a male DB9 connector and is a RS232 port with a full complement of handshaking lines allowing it to communicate with modems and other devices requiring hardware flow control (Note actual number of handshake lines is determined be the SoM)

Table 6: Serial Port COM C (JK3)

Pin	DB9 Connector: Description
1	COMC_232_DCD
2	COMC_232_RXD
3	COMC_232_TXD
4	COMC_232_DTR
5	COMC_232_GND
6	COMC_232_DSR
7	COMC_232_RTS
8	COMC_232_CTS
9	COMC_232_RI

- COM E is a serial console to USB device port terminating to a 5-Pin USB micro B connector. This port offers USB to asynchronous serial date transfers and includes RTD/TXD lines. A Green activity light is provided for the console interface and located at LD2.

Table 7: Serial Port COM E (JK4)

Pin	Micro USB B 2.0 Connector: Description
1	PWR
2	DM (Data -)
3	DP (Data +)
4	NC
5	GND

2.6 USB

The SoM-112ES provides dual USB 2.0 Type A host ports (USB PortA1 & A2), a single USB 2.0 Type A host port (USB Port B), and a single USB Type B device port (USB Port C). Ports A1 & A2 are provided via a USB Hub. USB HOST Port B and USB Device Port C are both provided directly from the SOM.

The SoM-112 USB circuitry contains a two port USB Hub allowing SoMs with three USB ports to provide four or SoMs with two USB ports to provide three. For the case where the SOM only has two USB ports, one of the two (USB-A) will go to the USB Hub and provide USB-A1 & USB-A2. USB-B goes to Jumper JB9 to allow routing of USB-B to either the USB Host Port (JK5: USB-B) or the Device Port (JK7: USB-C).

The default jumper setting for JB9 is Position A or NO jumper installed. This jumper only affects SOMs with two USB Ports such as the SOM-IMX6U. If a SOM with two USB Ports is used, this Jumper allows this port to be used as either USB Device Port C which is default (JB9 in the A Position or left open) or as USB Host Port B (JB9 in the B Position). To switch the USB routing on the SoM-IMX6U, GPIO3_IO2 pin needs to be toggled.

The USB host ports are fused with automatically resettable Polyfuses. If a USB device tries to draw more than 500 milliamps, the fuses will open. Once the drawing source is removed the fuses will automatically reset.

Note: When sizing a power supply, make sure to allow for USB Device consumption. A device can potentially draw 500mA, therefore these devices could use a total of up to 1.5 amp of power. USB ports must be supported by the SoM for the ports to operate.

A Micro USB Connector is provided as the system serial console (COM E). This makes it easier for modern day computers that are not equipped with a standard serial port to establish a console port connection.

2.7 CAN Port

The SoM-112ES provides a CAN 2.0 port utilizing the TI SN65HVD232 CAN Transceiver chip. Note, the CAN controller must be supported by the SOM in order to have CAN functionality. The CAN port is accessible via a 3-pin header (CN2).

Table 7: Pin-out for CAN 2.0 (CN2)

Pin	Signal
Pin 1	GND
Pin 2	CAN_L
Pin 3	CAN_H

2.8 MicroSD Card Socket

The SoM-112ES provides a high capacity MicroSD socket. This socket is hot-swappable and can accept a wide variety of Flash Cards. The MicroSD card is serviced through a USB bridge device as the native SoM SDIO port is dedicated to the Wireless module. A Red activity LED (LD3) will be lit when the Flash card is accessed and the card should not be removed at this time. A card that is written to by the SoM-112ES can be read by another computer using a MicroSD card reader. The MicroSD interface is compatible with Standard and High Capacity MicroSD cards.

2.9 Audio

The SoM-112ES provides Audio Line Out and Line In capabilities through two standard audio jacks (JK1 & JK2). Audio Jack JK1 is a stereo line level input and Audio Jack JK2 is a stereo line or headphone level output. The processor interfaces to the Audio CODEC through its I²S interface. Volume and Balance are controlled through software using the I²C interface lines I2C_CLK_E & I2C_DAT_E, which are accessible via HDR1. The CODEC is the NXP Semiconductors SGTL5000XNLA3, which is a flexible, low-power, 24-bit high performance stereo codec with integrated headphone amplifier. It features a capless headphone design and an internal PLL that allows inputs up to 27MHz.

2.10 Wi-Fi/Bluetooth [Optional]

The SoM-112ES provides one Wi-Fi/Bluetooth antenna jack (JK9) which utilizes the on-board Wi-Fi/Bluetooth Murata module (LBEE5KL1DX).

The antenna jack, (U.FL-R-SMT (10)) offers high frequency performance from DC to 6GHz, with a V.S.W.R of 1.3 to 1.5 max. EMAC provides an antenna kit: 2.4GHz Duck Antenna RP-SMA and U.FL.(IPEX) to RP-SMA male pigtail cable that plugs into the SoM's antenna jack. Alternatively, EMAC can provide a 2.4GHz IPEX MHF flat adhesive patch antenna.

WLAN/Bluetooth Features:

- 2.4GHz functionality
- 802.11 b/g/n data rates
- Interface: UART (COM D) for BT and SDIO (direct from SoM) for WLAN
- IC/Firmware: Cypress/CYW4343W
- Bluetooth 4.1 +EDR

2.11 I/O Expansion

The SoM-112ES provides access to a number of I/O lines on connector HDR1. The 50-pin dual row header contains GPIO lines, SPI bus, I2C bus, A/D lines, D/A lines, PWM, I2S, interrupts, and power pins. Signal names listed in the tables below are the SoM names as defined in the SoM 144 pin specification.

The SoM-112 is equipped with a Multi I/O chip (AD5593RBRUZ), that provides up to 8 digital input, 8 digital outputs, 8 Digital Analog Converter outputs and 8 Analog to Digital Converter inputs in any combination. The Multi I/O can be accessed through 8 pins (5 – 12) as listed below in Table 8.

Table 8: I/O Header (HDR1)

Pin	Signal	Pin	Signal
1	3P3_VCC	**2**	3P3_VCC
3	GND	**4**	EXPIO_REF
5	EXPIO_0	**6**	EXPIO_1
7	EXPIO_2	**8**	EXPIO_3
9	EXPIO_4	**10**	EXPIO_5
11	EXPIO_6	**12**	EXPIO_7
13	GPIO_5/AD-1	**14**	GPIO_6/AD-2
15	GPIO_7/AD-3	**16**	GPIO_8/AD-4
17	GND	**18**	GND
19	GPIO_9/MISO	**20**	GND
21	GPIO_10/MOSI	**22**	GND
23	GPIO_11/SCK	**24**	GND
25	GPIO_12/CS0n	**26**	GND
27	GPIO_13/CS1n	**28**	GND
29	SPI_EXT_MISO	**30**	GND
31	SPI_EXT_MOSI	**32**	GND
33	SPI_EXT_CLK	**34**	GND
35	SPI_EXT_CS1n	**36**	GND
37	SPI_EXT_CS2n	**38**	GND
39	GND	**40**	GND
41	I2C_CLK-E	**42**	GPIO_1/IRQ_1
43	I2C_DAT-E	**44**	GPIO_14/PWM1
45	SOM_RSTO#	**46**	GPIO_15/PWM2
47	5V_VCC	**48**	5V_VCC
49	GND	**50**	GND

2.12 Mikrobus Expansion

The SoM-112ES provides for a MikroBus Expansion Socket. This socket has two 8-pin female headers consisting of 3 groups of communication, 2 power groups, and 6 additional pins including PWM, Interrupt, Analog input, reset, and chip select. There are a large number of compatible MikroBuS add-on boards available in the market today that allow the end user to add functionality to development boards. The MikroBuS module is optional and not included.

2.13 I2C

The SoM-112ES is equipped with two I2C hardware ports. One is routed to the MikroBus Expansion Socket (SOK2) and the other is located on the Utility GPIO Header (HDR1). A TI TXS0102D voltage translator is utilized on the I2C interface allowing a 5V or 3.3V selection via JB6 jumper.

2.14 SPI

The SoM-112ES comes equipped with two Serial Peripheral Interface buses. One is routed to the MikroBus Expansion Socket (SOK2) and the other is located on the Utility GPIO Header (HDR1). A TI TXB0106 Voltage Translator is utilized on the SPI interface allowing a 5V or 3.3V selection via JB5.

2.15 Status LEDs and Reset

The SoM-112ES provides a Reset Button located at PB1. Pressing this button will cause the system to reset. A green status LED is also provided and is located at LD1.

2.16 Real-Time Clock

The SoM-112ES is equipped with an external battery (BH1) for backing up the module's Real-Time Clock (RTC). Drivers to access the RTC are included in the operating systems. Jumper JB1 should be placed in the ON position in order to retain system time when powered down.

3 Software

The SoM-112ES offers a wide variety of software support from both open source and proprietary sources. Software Board Support Packages (BSPs) and Linux Software Development Kits (SDKs) are available for most SoM processor modules.

For more information on Linux Software Support, please visit the EMAC Wiki Software Section at:

http://wiki.emacinc.com/wiki/Product_wiki

3.1 Das U-Boot

EMAC utilizes Das U-Boot for its ARM based products. U-Boot is an open source/cross-architecture platform independent bootloader. It supports reading and writing to the flash, auto-booting, environmental variables, and TFTP. Das U-boot can be used to upload and run and/or reflash the OS or to run stand-alone programs without an OS. Products are shipped with a valid MAC address installed in flash in the protected U-boot environmental variable "ethaddr". At boot time U-Boot automatically stores this address in a register within the MAC, which effectively provides it to any OS loaded after that point.

3.2 Embedded Linux

EMAC Open Embedded Linux (EMAC OE Linux) is an open source Linux distribution for use in embedded systems. The EMAC OE Linux Build is based on the Open Embedded (www.openembedded.org) and Yocto (www.yoctoproject.org) Linux build systems. Open Embedded is a superior Linux distribution for embedded systems. Custom Linux builds are also available on request.

The distribution contains everything a user could expect from a standard Linux kernel: powerful networking features, advanced file system support, security, debugging utilities, and countless other features.

The basic root file system includes:

- Busybox
- Hotplugging support
- APM utilities for power management
- Openssh SSH server
- lighttpd HTTP server
- JJFS2 or EXT4 file system with utilities

3.2.1 Linux with Xenomai Real Time Extensions

Xenomai provides real time extensions to the kernel and can be used to schedule tasks with hard deadlines and μs latencies. The Xenomai build is an additional module that can be added to the standard Linux kernel and is available for a one-time inexpensive support/installation fee.

http://www.xenomai.org/

3.2.2 Linux Packages

EMAC provides support for many Linux Packages such as: PHP, SQLite, Perl, SNMP, DHCP Server, etc. As with the Xenomai Package, other Packages can be added to the standard Linux file system and are available for a one-time inexpensive support/installation fee.

3.2.3 Linux Patches

In addition to standard Embedded Linux support, EMAC has released a number of patches and device drivers from the open source community and from internal EMAC engineering into its standard distribution. Along with kernel patches, EMAC provides the binaries for the kernel and root file system.

3.3 Qt Creator

Qt Creator is a cross-platform IDE (Integrated Development Environment) tailored to the needs of Qt developers but works well for Headless applications as well. EMAC provides sample code as projects that can be imported into Qt Creator. Qt Creator supports remote deployment and source debugging.

http://wiki.qt.io/Main

3.4 ARM EABI Cross Compiler

The popular open source gcc compiler has a stable build for the ARM family. EMAC uses the 4.9.1 version of the ARM EABI compiler. The Embedded Linux kernel and EMAC Qt Creator projects use this compiler for building ARM stand alone, and OS specific binaries. The EMAC Qt Creator provides source level debugging over Ethernet or serial using gdbserver. The Linux binaries for the ARM EABI cross compiler are available online along with the SDK. See the EMAC wiki for further information.

4 Appendix A: Connector Pinouts

4.1 4-Pin Molex Male Floppy Power Connector (CN1)

Pin	Signal
Pin 1	5V
Pin 2	GND
Pin 3	GND
Pin 4	12V

4.2 3-Pin Polarized Locking CAN Connector (CN2)

Pin	Signal
Pin 1	GND
Pin 2	CAN_L
Pin 3	CAN_H

4.3 Utility GPIO Header (HDR1)

Pin	Signal	Pin	Signal
1	3P3_VCC	**2**	3P3_VCC
3	GND	**4**	EXPIO_REF
5	EXPIO_0	**6**	EXPIO_1
7	EXPIO_2	**8**	EXPIO_3
9	EXPIO_4	**10**	EXPIO_5
11	EXPIO_6	**12**	EXPIO_7
13	GPIO_5/AD-1	**14**	GPIO_6/AD-2
15	GPIO_7/AD-3	**16**	GPIO_8/AD-4
17	GND	**18**	GND
19	GPIO_9/MISO	**20**	GND
21	GPIO_10/MOSI	**22**	GND
23	GPIO_11/SCK	**24**	GND
25	GPIO_12/CS0n	**26**	GND
27	GPIO_13/CS1n	**28**	GND
29	SPI_EXT_MISO	**30**	GND
31	SPI_EXT_MOSI	**32**	GND
33	SPI_EXT_CLK	**34**	GND
35	SPI_EXT_CS1n	**36**	GND
37	SPI_EXT_CS2n	**38**	GND
39	GND	**40**	GND
41	I2C_CLK-E	**42**	GPIO_1/IRQ_1
43	I2C_DAT-E	**44**	GPIO_14/PWM1
45	SOM_RSTO#	**46**	GPIO_15/PWM2
47	5V_VCC	**48**	5V_VCC
49	GND	**50**	GND

4.4 RS-232 Serial Port COM A Header (HDR2)

Pin	10-Pin Header: Description
1	NC
2	NC
3	COMA_RX232
4	NC
5	COMA_TX232
6	NC
7	NC
8	NC
9	GND
10	NC

4.5 RS-232/422/485 Serial Port COM B Header (HDR3)

Pin	RS-232 10-Pin Header: Description	RS-422/485 10-Pin Header: Description
1	NC	COMB_422/485_TX-
2	NC	NC
3	COMB_232RX	COMB_422/485_TX+
4	COMB_232_RTS	NC
5	COMB_232TX	COMB_422/485_RX+
6	COMB_232_CTS	NC
7	NC	COMB_422/485_RX-
8	NC	NC
9	GND	GND
10	NC	NC

4.6 Audio Input Jack (JK1)

Pin	Signal
1	GND
2	LINEIN_L
3	LINEIN_R

4.7 Audio Output Jack (JK2)

Pin	Signal
1	GND
2	HP_L
3	HP_R

4.8 Serial Port COM C (JK3)

Pin	DB9 Connector: Description
1	COMC_232_DCD
2	COMC_232_RXD
3	COMC_232_TXD
4	COMC_232_DTR
5	COMC_232_GND
6	COMC_232_DSR
7	COMC_232_RTS
8	COMC_232_CTS
9	COMC_232_RI

4.9 Micro USB B 2.0 Console Interface Connector (JK4)

Pin	Micro USB B 2.0 Connector: Description
1	PWR
2	DM (Data -)
3	DP (Data +)
4	NC
5	GND

4.10 USB Host Port B (JK5)

Pin	Signal
1	PWR
2	USBB_DM
3	USBB_DP
4	GND
5	CHASSIS_GND
6	CHASSIS_GND

4.11 USB Host Port A1 & A2 (JK6)

Pin	Signal
T1	HSTA'_PWR
T2	HSTA'_DM_F
T3	HSTA'_DP_F
T4	GND
9	CHASSIS_GND
10	CHASSIS_GND
11	CHASSIS_GND
12	CHASSIS_GND
13	NC
B1	HSTB'_PWR
B2	HSTB'_DM_F
B3	HSTB'_DP_F
B4	GND

4.12 USB Device Port C (JK7)

Pin	Signal
1	PWR
2	USBC_DM
3	USBC_DP
4	GND
5	CHASSIS_GND
6	CHASSIS_GND
7	CHASSIS_GND
8	CHASSIS_GND

4.13 Single Port Ethernet Connector (JK8)

Pin	Signal
1	ETX-
2	ETX+
3	ERX+
4	GND
5	GND
6	ERX-
7	GND
8	GND

4.14 Vin Power Barrel Jack (JK10)

Pin	Signal
1	Vin
2	GND
3	NC

4.15 MikroBUS Socket (SOK2)

Pin	Signal
1	GPIO_5/AD-1
2	SOM_RSTO#
3	SPI_EXT_CS0n
4	SPI_EXT_CLK
5	SPI_EXT_MISO
6	SPI_EXT_MOSI
7	3P3_VCC
8	GND
9	GND
10	5V_VCC
11	I2C_DAT_E
12	I2C_CLK-E
13	COMD_TXD
14	MKR_RX_GT
15	GPIO_1/IRQ_1
16	GPIO_14/PWM1

4.16 Micro SD Card Socket (SOK3)

Pin	Signal
1	MSD_DAT2
2	MSD_DAT3
3	MSD_CMD
4	MSD_PWR
5	MSD_SCLK
6	GND
7	MSD_DAT0
8	MSD_DAT1
9	MSD_CDT#
10	GND

5 Appendix B: Jumper Settings

5.1 JB1 (Boot0 Source Selection)

Jumper	Position	Setting
Pins 1 & 2	B	Line Pulled High
Pins 2 & 3*	A	Line Pulled Low

*Default Setting

5.2 JB2 (Boot1 Source Selection)

Jumper	Position	Setting
Pins 1 & 2	B	Line Pulled High
Pins 2 & 3*	A	Line Pulled Low

*Default Setting

5.3 JB3 (Flash Write Protect)

Jumper	Position	Setting
Pins 1 & 2	B	Flash Disable
Pins 2 & 3*	A	Flash Enable

*Default Setting

5.4 JB4 (Standby Battery)

Jumper	Position	Setting
Pins 1 & 2	OFF	Disable Battery Backup
Pins 2 & 3*	ON	Enable Battery Backup

*Default Setting

5.5 JB5 (External SPI Interface Voltage)

Jumper	Position	Setting
Pins 1 & 2	5V	5V SPI Level
Pins 2 & 3*	3.3V	3.3V SPI Level

*Default Setting

5.6 JB6 (External I2C Interface Voltage)

Jumper	Position	Setting
Pins 1 & 2	5V	5V I^2C Level
Pins 2 & 3*	3.3 V	3.3V I^2C Level

*Default Setting

5.7 JB7 (Serial Port RS-232 or RS-422/485)

Jumper	Position	Setting
Pins 1 & 2*	232	Select RS-232
Pins 2 & 3	4XX	Select RS-422/485 via JB8

*Default Setting

5.8 JB8 (Serial Port RS-422 or RS-485)

Jumper	Position	Setting
Pins 1 & 2	485	Select RS-485
Pins 2 & 3*	422	Select RS-422

*Default Setting

5.9 JB9 (USB Device Port C Enable)

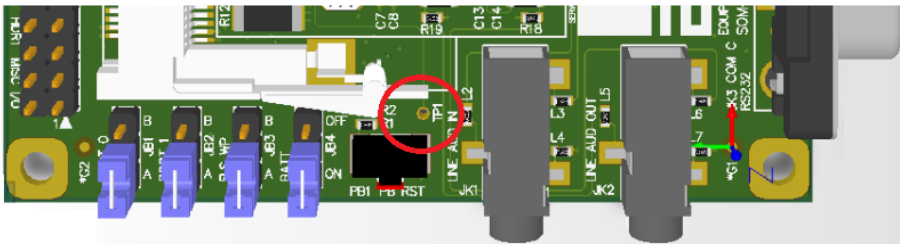
Jumper	Position	Setting
Pins 1 & 2	A	Enable Port C
Pins 2 & 3	B	Enable Port B

Default Setting – Default set to A Position or NO jumper installed. This jumper only affects SOMs with two USB Ports such as the SOM-IMX6U. If a SOM with two USB Ports is used, this Jumper allows this port to be used as either USB Device Port C which is default (JB9 in the A Position or left open) or as USB Host Port B (JB9 in the B Position).

5.10 TP1 (SoM Current Measurement Test Point)

This test point allows measuring the amount of current the SoM is drawing and is useful when debugging software that invokes power down modes.

With a voltmeter it will read 1 volt per 1 amp. TP1 is not software accessible.



7 Appendix C: Dimensional Drawing