

EMB-7610

Technical Specification Manual

Version: R1.00

Revisions

Version	Description of Version	Date Completed
R1.00	Release	11/26/2018

Preface

This Technical Specification Manual (TSM) specifies the board layout, components, connectors, and the I/O connection ports, motherboards features.

Intended Audience

The TSM is intended to provide detailed, technical information about the EMB-7610 and its components to the vendors, system integrators, and other engineers and technicians who need this level of information. It is specifically not intended for general audiences.

What This Document Contains

Chapter	Description
1	Introduction
2	Product Description
3	Technical Reference
4	Operating System

1. Introduction

1.1 Product introduction

The EMB-7610 is a small form factor industrial motherboard based on Intel Apollo Lake Celeron Processor. The board features a Power over Ethernet (PoE) ready Ethernet port, two m.2 sockets, standard SATA and m.2 SATA interfaces, multiple LCD panel display interfaces support, and full set of I/Os including RS-232/485, digital IO and more

1.2 Form Factor

The EMB-7610 is a single board computer with proprietary form factor with 150 x 90 mm (5.9" x 3.54").

2. Product Description

2.1 Specification

Table 1 summarizes the major features of the board.

Table 1. Specification

Platform	Apollo Lake
Form Factor	Proprietary
Processor	Intel Dual Core Celeron N3350 (2M Cache, up to 2.4 GHz) or Quad Core Celeron N3450 (2M Cache, up to 2.2 GHz)
System Memory	1 x 204-Pin SO-DIMM DDR3L up to 8G
Ethernet	1 x 10/100/1000 Mbps I211 GbE, 1 x 10/100Mbps I211 Ethernet support POE (optional module)
Wireless	m.2 2230 E-Key expansion slot, option WiFi module
Audio	ALC662, 1x Mic-in, 1x Line Out, 1x Speaker out (up to 6W/ch)
Storage	1x m.2 2230 B-Key SATA slot, 1x SATA port, 1x micro SD slot
Graphic Controller	Intel HD Graphics 500
Display Interface	1x micro HDMI
LCD Interface	1x LVDS/eDP and 1x MIPI DSI for 7", 10.1" and other panel size LCD panel
Display Resolution	HDMI – 1920x 1080, LVDS/eDP/MIPI DSI – 1920x 1200
I/O	1x RS-232/RS-485 terminal block, 1x RS-232 header 2x USB2.0 Type A, 4x USB2.0 header, 1x micro USB 2.0 4+ GPIO, 2x I2C (for TP and MIPI CSI) 1x MIPI CSI
I/O Terminal Block	5-pin header with two combination of RS-232, RS-485, and 2 x GPIO
RTC	1 x CMOS battery input, 2-pin wafe heder, 1.25mm
Power Input	1 x 12VDC 5.5mm x 2.5mm barrel power jack or POE via RJ45
Expansion	1x 40pin connector with PCIe x1, GPIO, font panel control, POE power input
Operating Temperature	0 ~ 60°C (32 ~ 140°F)
Storage Temperature	-40 ~ 85° C (-40 ~ 185° F)
Operating Humidity	5% ~ 95%, 40°C, non-condensing
Dimensions	150 x 90 mm (5.9" x 3.54")
OS Support	Windows 10, Windows 10 IoT, Ubuntu Linux

2.2 Board Layout

Figure 1 shows the location of the major components on the top and bottom-side of the EMB-7610.

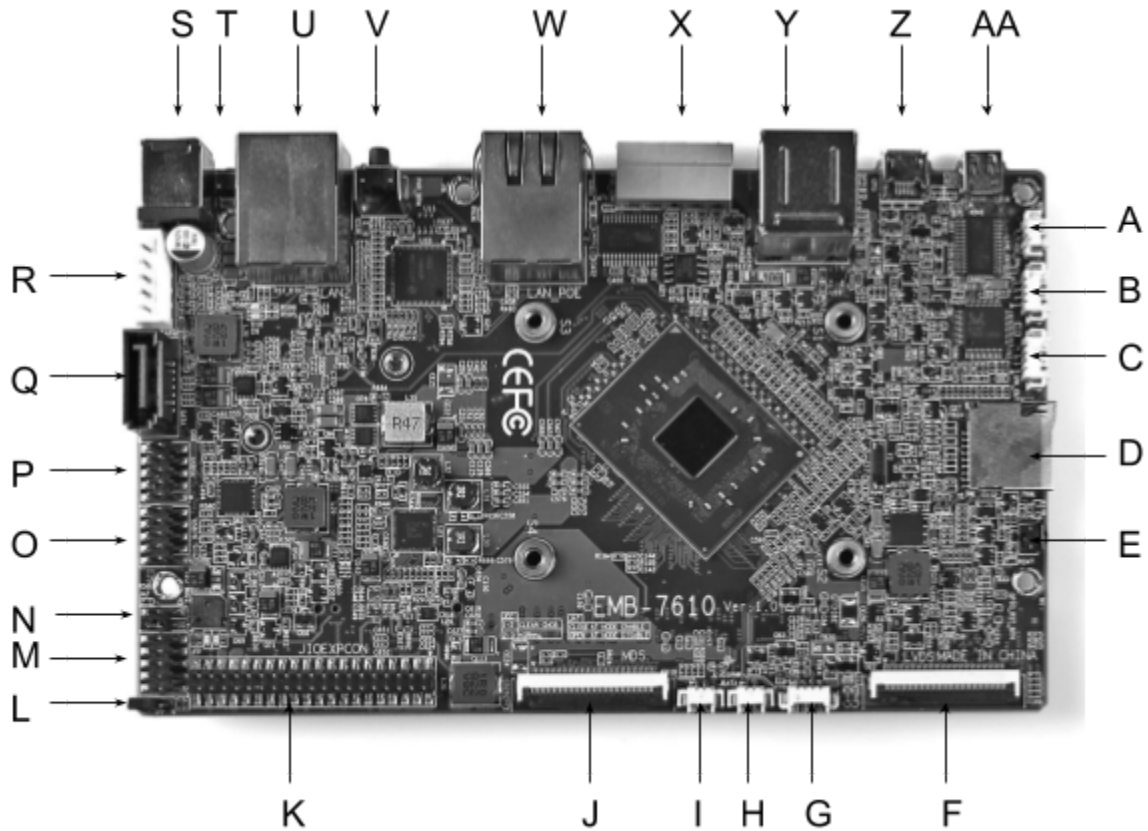


Table 2 lists the components identified in Figure 1

Table 2. Components Show in Figure 1

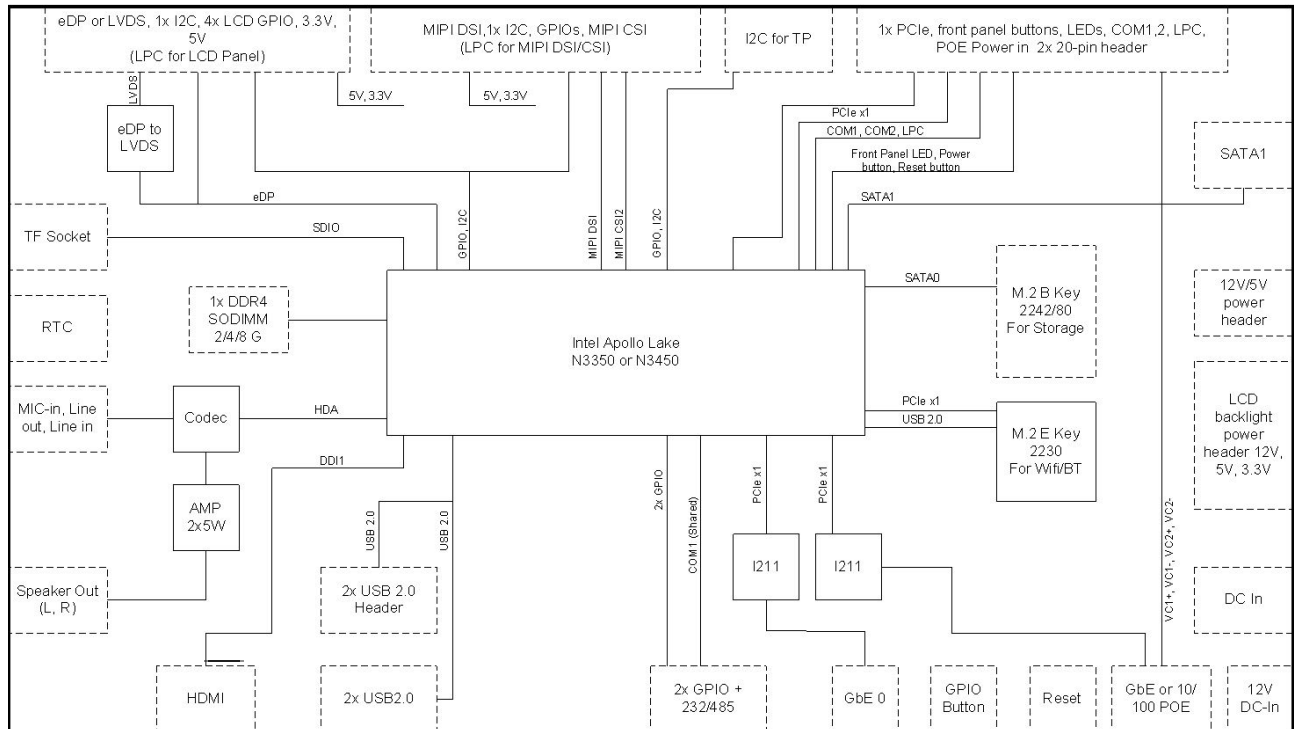
Item from Figure 1	Connector	Description
A	MIC-IN	Mic in
B	LINE-OUT	L/R Line out or L/R Headphone out
C	SPK-OUT	L/R Speaker out
D	TF	micro SD socket
E	GPIO-BTN	GPIO Button
F	LVDS	LVDS/eDP LCD FPC connector
G	LVDSPOWER	LCD panel power header
H	JBATA	CMOS battery header
I	JEDID	I2C header
J	MDS	MIPI DSI LCD FPC connector
K	JIOEXPCON	12V DC in, 3.3V out, PCIe signals, GPIOs, RS-232, power button, reset, POE power signals header
L	JCC	Clear CMOS jumper
M	JFP	Front panel control header
N	JAT	Automatic Power Up selection jumper
O	USB78	2x USB 2.0 header
P	USB56	2x USB 2.0 header

Q	SATA	SATA data header
R	SATAPWR	SATA drive power header
S	PWR2	12V DC Input
T	RST-BTN	Reset button
U	LAN2	RJ45 connector for 1000M Ethernet
V	PWR-BTN	System Power On/Off
W	LAN-POE	RJ45 connector for 10/100M Ethernet with POE
X	GPIO-COM	RS232 or RS485 plus GPIOs
Y	USB34	USB Type A for 2x USB 2.0
Z	OTG	Micro USB for 1 x OTG USB 2.0
AA	HDMI1	Micro HDMI connector for HDMI port

2.3 Block Diagram

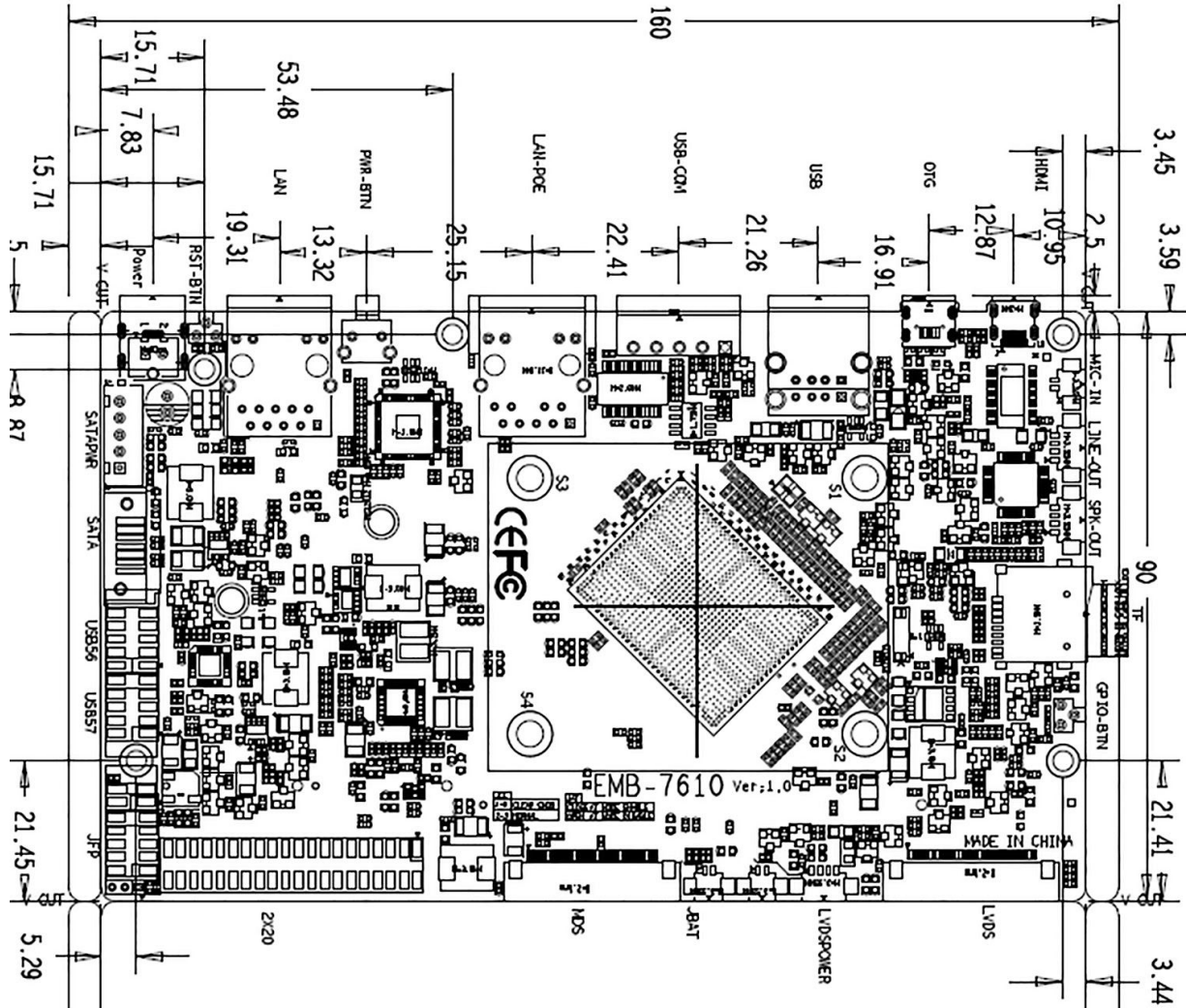
Figure 2 is a block diagram of the major functional areas of the board.

Figure 2. Block Diagram



2.4 Dimensions

Figure 3 is board layout dimensions (unit: mm).



3. Technical Reference

3.1 Connectors and Headers

Table 3. MIC-IN MIC In Header (Figure. 1. A)

Pin	Signal Name	Pin	Signal Name
1	MIC1	2	GND

Table 4. LINE_OUT Line Out or Headphone Out (Figure. 1. B)

Pin	Signal Name
1	Line-out (L)
2	Line-out (R)
3	GND
4	MIC1

Table 5. SPK-OUT Speaker out (Figure. 1. C)

Pin	Signal Name
1	Speaker_out R-
2	Speaker_out R+
3	Speaker_out L-
4	Speaker_out L+

Table 6. LVDS LVDS/eDP and I2C TP Header (Figure. 1. F)

Pin	Signal Name	Pin	Signal Name
1	VCC_Panel (5V)	21	LVDSB_TX0_N
2	VCC_Panel (5V)	22	GND
3	LVDS_PWM_OUT_R/EDP_BKLCT RL (3.3V)	23	LVDSB_TX1_P
4	GND	24	LVDSB_TX1_N
5	LVDSA_TX0_P / EDP_TX0_DP	25	GND
6	LVDSA_TX0_N / EDP_TX0_DN	26	LVDSB_TX2_P
7	GND	27	LVDSB_TX2_N
8	LVDSA_TX1_P / EDP_TX1_DP	28	GND
9	LVDSA_TX1_N / EDP_TX1_DN	29	LVDSB_CLK_P
10	GND	30	LVDSB_CLK_N
11	LVDSA_TX2_P	31	GND
12	LVDSA_TX2_N	32	LVDSB_TX3_P
13	GND	33	LVDSB_TX3_N
14	LVDSA_CLK_P / EDP_AUX_DP	34	GND
15	LVDSA_CLK_N / EDP_AUX_DN	35	SCL_TP (3.3V)
16	GND	36	SDA_TP (3.3V)
17	LVDSA_TX3_P	37	BKLTEN_R (3.3V)

18	LVDSA_TX3_N / DDI0_HPD	38	TCHPAD_INT_N (3.3V)
19	GND	39	LCD_PWR_ON / BKL_UP / RESET_TP_R (3.3V)
20	LVDSB_TX0_P	40	GND

Table 7. LVDSPOWER LCD Panel Power Header (Figure. 1. G)

Pin	Signal Name
1	VCC5_S
2	GND
3	GND
4	VCC12_S

Table 8. JBATA CMOS Battery Header (Figure. 1. H)

Pin	Signal Name	Pin	Signal Name
1	CMOS Battery +	2	CMOS Battery -

Table 9. JEDID LCD Panel I2C Header (Figure. 1. G)

Pin	Signal Name
1	EDID_SDA
2	EDID_SCL
3	GND
4	GND

Table 10. MDS MIPI CSI DSI Header (Figure. 1. J)

Pin	Signal Name	Pin	Signal Name
1	+5V_LCD	21	TP_SCL
2	5V_LCD	22	TP_SDA
3	MCSI1_XVCLK	23	CAM/TP_RST_R
4	TCHPAD_INT_N(GPIO)	24	BKLT_EN (GPIO)
5	CAM_PWRDWN	25	MIPI_BKLT_PWM
6	CSI_CLK_DP	26	GND
7	CSI_CLK_DN	27	MDSI_CLK_DP
8	GND	28	MDSI_CLK_DN
9	CSI_DATA0_DP	29	GND
10	CSI_DATA0_DN	30	MDSI_DATA0_DP
11	GND	31	MDSI_DATA0_DN
12	CSI_DATA1_DP	32	GND
13	CSI_DATA1_DN	33	MDSI_DATA1_DP
14	GND	34	MDSI_DATA1_DN
15	CSI_DATA2_DP	35	GND
16	CSI_DATA2_DN	36	MDSI_DATA2_DP
17	GND	37	MDSI_DATA2_DN
18	CSI_DATA3_DP	38	MDSI_DATA3_DP
19	CSI_DATA3_DN	39	MDSI_DATA3_DN

20	GND	40	VCC3P3_S
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Table 11. JIOEXPCON 40-pin Expansion Header (Figure. 1. K)

Pin	Signal Name	Pin	Signal Name
1	GND	21	GPIO80 (3.3V)
2	VCC12_S	22	GPIO82 (3.3V)
3	PCIE_REFCLK3_DN	23	GPIO81 (3.3V)
4	VCC12_S	24	GPIO83 (3.3V)
5	PCIE_REFCLK3_DP	25	GPIO86 (3.3V)
6	VCC12_S	26	GPIO84 (3.3V)
7	GND	27	GPIO87 (3.3V)
8	VCC3P3_A	28	GPIO85 (3.3V)
9	PCI3_TXN	29	GPIO72 (3.3V)
10	Power_nBTN	30	DEVCE_PLTRST
11	PCI3_TXP	31	GND
12	Bootloader_BTN (GPIO)	32	GND
13	GND	33	VC1+ (POE Power In)
14	GND	34	VC2+ (POE Power In)
15	PCI3_RXN	35	VC1- (POE Power In)
16	Serial_TXD	36	VC2- (POE Power In)
17	PCI3_RXP	37	GND
18	Serial_RXD	38	GND
19	GND	39	RS232_4_TXD
20	GND	40	RS232_4_RXD

Table 12. JCC CMOS Clear Header (Figure. 1. L)

Pin	Signal Name	Pin	Signal Name
1-2	Clear CMOS	2-3	Normal

Table 13. JFP Front Panel Control Header (Figure. 1. M)

Pin	Signal Name
1	PLEC+
2	GND
3	HDD_LED+
4	SATA_LED_N_R
5	VCC5_S
6	BUXXDATA#
7	RSTBTN_N_R
8	GND
9	PWRBTN_N
10	GND

Table 14. JAT Automatic Power Up Selection Header (Figure. 1. N)

Pin	Signal Name	Pin	Signal Name
Close	Automatic Power Up Enable	Open	Automatic Power Up Disable

Table 15. USB56, USB78 USB Headers (Figure. 1. O, P)

Pin	Signal Name	Pin	Signal Name
1	VCC	2	GND
3	USBD_N	4	GND
5	USBD_P	6	USBD_P
7	GND	8	USBD_N
9	GND	10	VCC_USB1

Table 16. SATA SATA Data Header (Figure. 1. Q)

Pin	Signal Name
1	GND
2	SATA_TXP1
3	SATA_TXN1
4	GND
5	SATA_RXN1
6	SATA_RXP1
7	GND

Table 17. SATAPWR SATA Power Header (Figure. 1. R)

Pin	Signal Name
1	+3.3V
2	GND
3	+5V
4	GND
5	+12V

Table 18. GPIO-COM I/O Port (Figure. 1. X)

Options	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
1 (Default)	RS232_RX	RS232_TX	GND	GPIO_1	GPIO_2
2	RS485-	RS485+	GND	GPIO_1	GPIO_2

Table 19. OTG OTG Port (Figure. 1. Z)

Pin	Signal Name
1	USB_OTG_VBUS
2	USB_DN0
3	USB_DP0
4	USB_OTG_ID
5	GND

Table 20. HDMI1 Micro HDMI Port (Figure. 1. AA)

Pin	Signal Name
1	HPD_OUT

2	Utility
3	HDMI_D2P
4	GND
5	HDMI_D2N
6	HDMI_D1P
7	GND
8	HDMI_D1N
9	HDMI_D0P
10	GND
11	HDMI_D0N
12	HDMI_CLKP
13	GND
14	HDMI_CLKN
15	HDMI_CEC_OUT
16	GND
17	HDMI_DDC_CLK_OUT
18	HDMI_DDC_DAT_OUT
19	HDMI_5V_OUT

3.2 Signal and Power Considerations

1. When providing power from the extension board via the expansion 40pin headers, not required connect the 12V DC power input jack (PWR2) on the mainboard at the same time.
2. The USB_5V output current from the USB headers has a limit of 1A
3. When providing power from the expansion board via the expansion 40-pin headers, make sure to provide enough current (2A or more) to the mainboard
4. Speaker amplifier output: 6W /CH.

3.3 Boot Options

The board can be selected to boot up from with or without pressing the power button. See Table 14.

4. Operating System

4.1 OS Support

- a. Windows 10
- b. Windows 10 IOT
- c. Ubuntu 14.04 or newer

4.2 Default LCD and Touch Panel Support

- a. Support 7", 10.1" LCD panel models: INNOLUX P070BAG-CM1 (1024 x 600 LVDS), INNOLUX EJ1011A-01G (1280 x 800 LVDS), AUO B101UAN01.7 (1920 x 1200 MIPI)
- b. Support 7" and 10" I2C capacitive touch panel