Kneron KL520 series AI SoC

Development Kit (BGA159, 3.8x3.8)

Product Information

Revision History:

version	description	date
0.1	Initial version	2019/10/24

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1. Overview

1.1 General description

Kneron KL520 series is an AI SoC targeting smart-home and IoT segment with Kneron NPU core inside to accelerate neural network processing and enabling devices with edge AI ability to achieve Kneron's AI everywhere vision.

This document describes how to use the KL520 AI SoC Development Kit (BGA159, 3.8x3.8).

2. Hardware description

2.1 Product SPEC

Product name	**Kneron KL520 series AI SoC Development Kit (BGA159, 3.8x3.8)**
Kneron part number	**KP52B1330-M1**
Main board dimension	**38(L) x 38(W) x 1.6(H) mm**
Working voltage	**5V**
DDR memory size	**64MB**
SPI NOR Flash size	**32MB**
Switch & button	**PTN button x 1**
Interface - Power	**Micro USB (5V) x 1, 1.27 pin conn**
Interface – Fixed I/O	**UART x 2, micro USB (client) x 1**
	1.27 x 20 conn x 2 (2-lane MIPI camera)
	1.27 x 20 conn x 1 (SPI,I2S, I2C,SDIO)
	1.27 x 10 conn x1 (5V, USB, PTN, RESET_N)
Accessory - Camera sensor	TBD
Accessory - NIR LED	TBD
Accessory - LCD Display	TBD

2.2 Inside the box

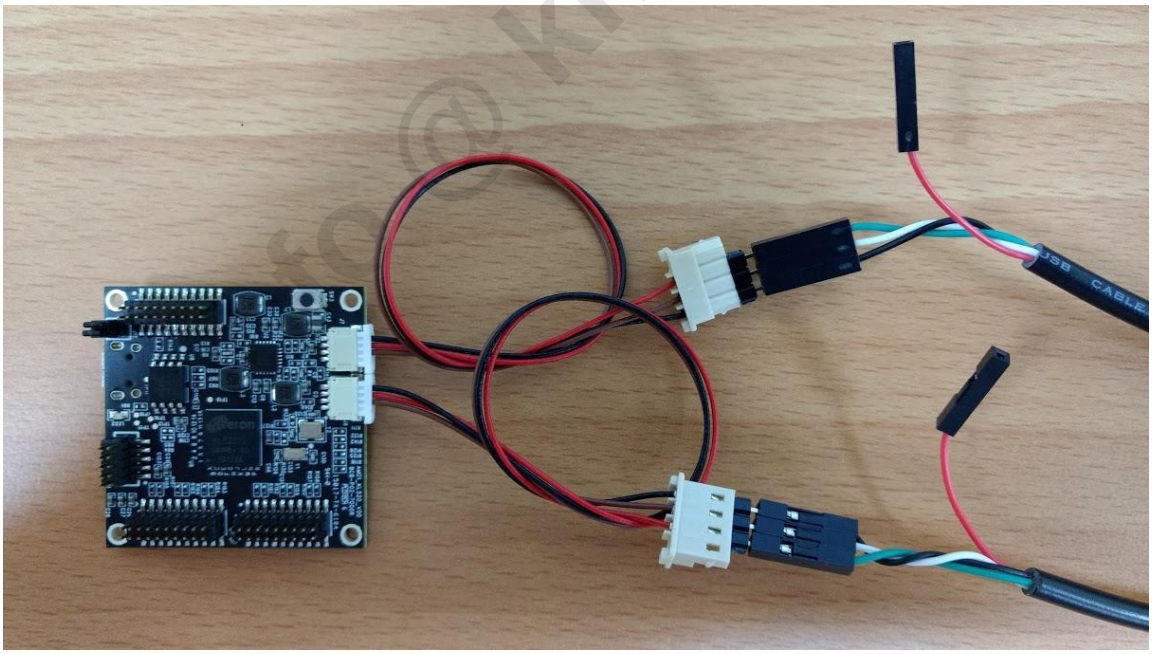
Main board x 1

UART cable (1.27 to 2.54) x 2

USB to TTL cable (3.3V) x 2

Micro USB cable x 1

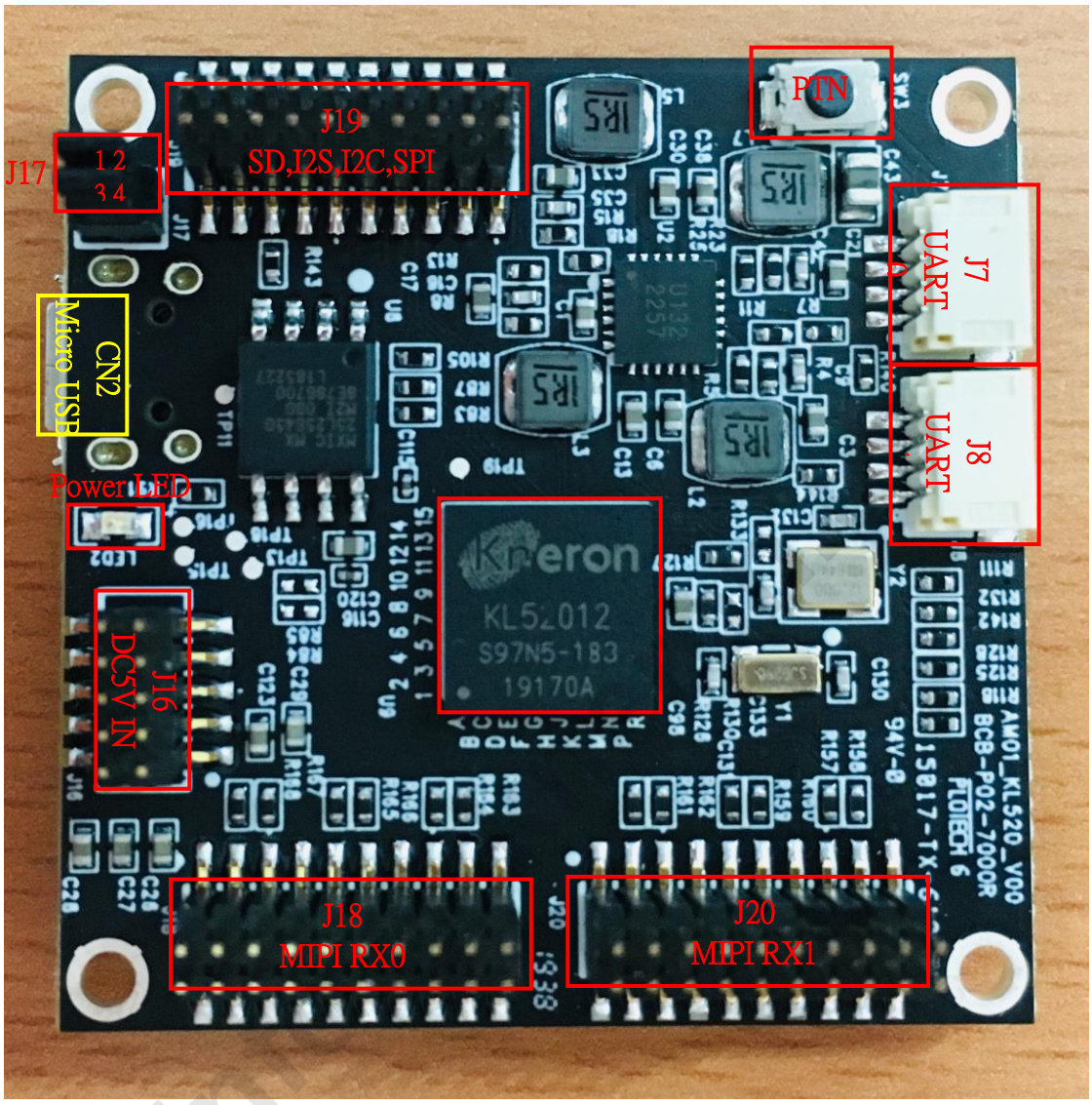
2.3 Assembly



2.4 Main board description

Here's the overview of all functions on the main board.

Here's the overview of how EVB looks like:



Figure, Top overview

As you can see in the picture, here's the major component you must know before you start your design:

- KL520: AI SoC.
- 5V Power (J16): 5V input for the development board, used a 5V/2A adaptor.
- Micro USB connector: Supply 5V input, also used the USB interface for developing.
- UART0/UART4: a connector that uses a TTL to USB cable for developing.
- PTN: a button that used to turn on the KL520.
- Micro USB connector: Supply 5V input also used it for developing.

2.5 Pin mux and Jumpers

To make some flexibility for the developers, the development board has made some jumper options. Most IOs has series jumper on it. If users want to do some other thing that do not include in development board, he can just take off the jumper and jump to other peripherals or even scope for debugging. Some IOs also offers different functionality, users can simply choose different functions by choosing different jumper location. Bellowing table shows the hardware setting on the development board.

KL520 pin number	Default state	EVB H/W setting
H14	SPI_WP_N	SPI_WP_N
J11	SPI_HOLD_N	SPI_HOLD_N
E11	X_JTAG_TRST_N	X_JTAG_TRSTn, Pull Low
C15	X_JTAG_TDI	X_JTAG_TDI
E15	X_JTAG_SWDITMS	***X_JTAG_TMS***
F14	X_JTAG_SWCLKTCK	***X_JTAG_TCK***
B15	X_JTAG_TDO	X_JTAG_TDO,floating
B11	X_LC_PCLK	GPIO1_CAM
E7	X_LC_VS	GPIO4_CAM
E8	X_LC_HS	GPIO3_CAM
A11	X_LC_DE	GPIO2_CAM
A12	X_LC_DATA[0]	I2S0_BCLK
E9	X_LC_DATA[1]	I2S0_RCLK
B12	X_LC_DATA[2]	I2S0_SDATA
B13	X_LC_DATA[3]	Reserve
A13	X_LC_DATA[4]	Reserve
B14	X_LC_DATA[5]	Reserve
D14	X_LC_DATA[6]	I2C1_CLK
D15	X_LC_DATA[7]	I2C1_DATA
F11	X_LC_DATA[8]	Reserve
E14	X_LC_DATA[9]	Reserve
F15	X_LC_DATA[10]	UART4_RX
H11	X_LC_DATA[11]	UART4_TX
G14	X_LC_DATA[12]	SPI1_CLK
G11	X_LC_DATA[13]	SPI1_CS
G15	X_LC_DATA[14]	SPI1_DI
H15	X_LC_DATA[15]	SPI1_DO
K11	X_SD_CLK	SD_CLK
J15	X_SD_CMD	SD_CMD
L10	X_SD_DAT[0]	SD_DAT[0]
K14	X_SD_DAT[1]	SD_DAT[1]
K15	X_SD_DAT[2]	SD_DAT[2]
L11	X_SD_DAT[3]	SD_DAT[3]
E6	X_UART0_RX	UART0_RX
B10	X_UART0_TX	UART0_TX
E10	X_I2C0_SCL	I2C0_SCL
A15	X_I2C0_SDA	I2C0_SDA
C14	X_PWM0	Reserve

Table, Development board HW setting

Boot strap setting (J17)

- Pin 1-2 : Boot_IPL_SEL, default short
- Pin 3-4 : Boot_SPL_SEL
  - Short: SPL is specified by UART
  - Open: SPL is located in SPI flash

3. Peripherals

Here list the peripherals you need for the board development.

3.1 5V adaptor

A 5V/2A micro USB is needed to provide the power of evaluation board. The package only have USB-A male to micro USB cable but not power adaptor

Figure, 5V/2A Micro USB cable

3.2 UART cable

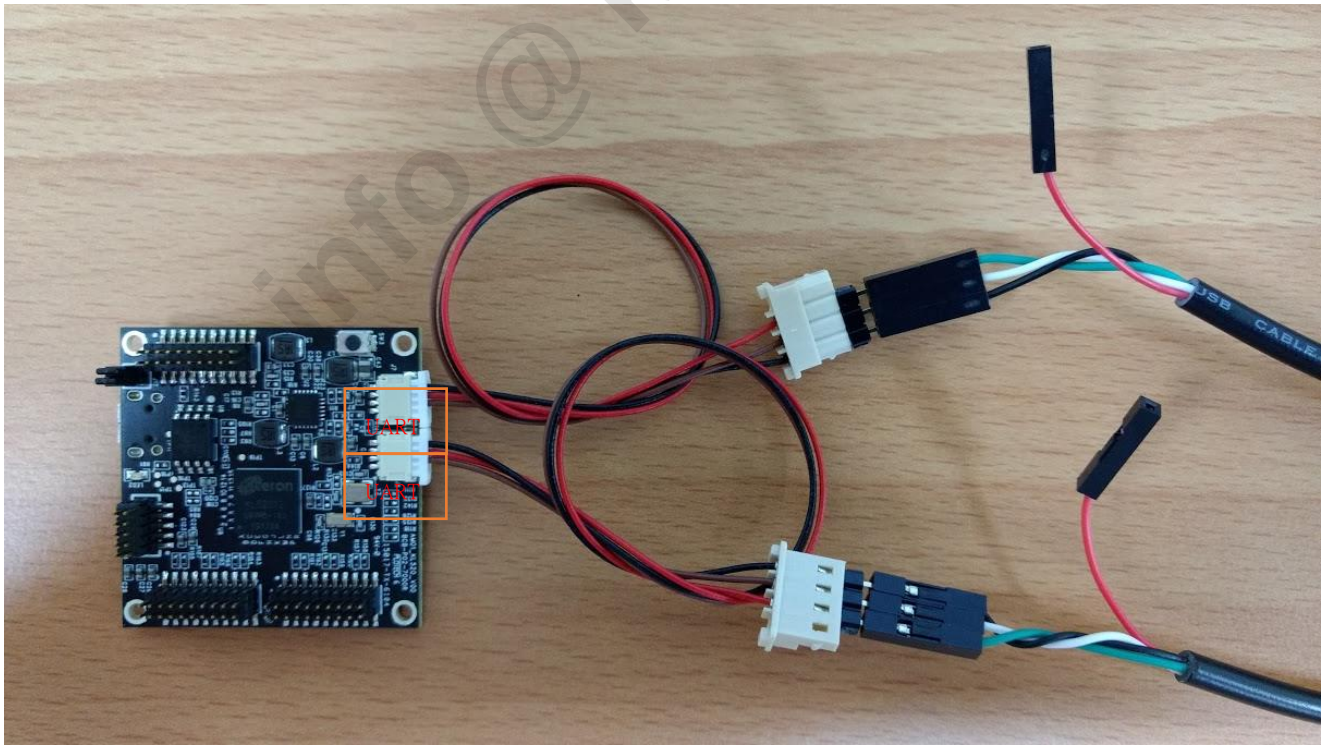
Figure, USB to TTL (3.3V) cable

3.3 JTAG cable (not included in Kneron shipping box)

Figure, JTAG cable

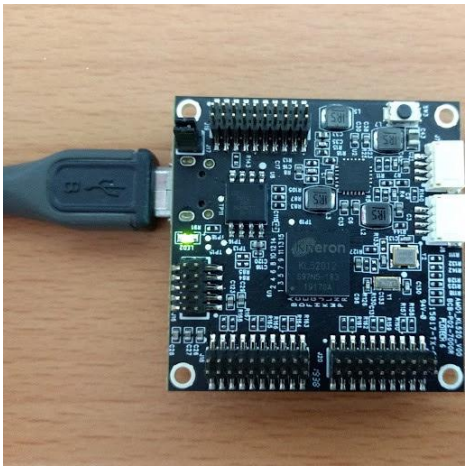
3.4 Connecting UART

Please connect the TX, RX and GND signal of UART cable to evaluation board as shown below.



Figure, UART0 and UART4 connection

3.5 Connecting 5V Power

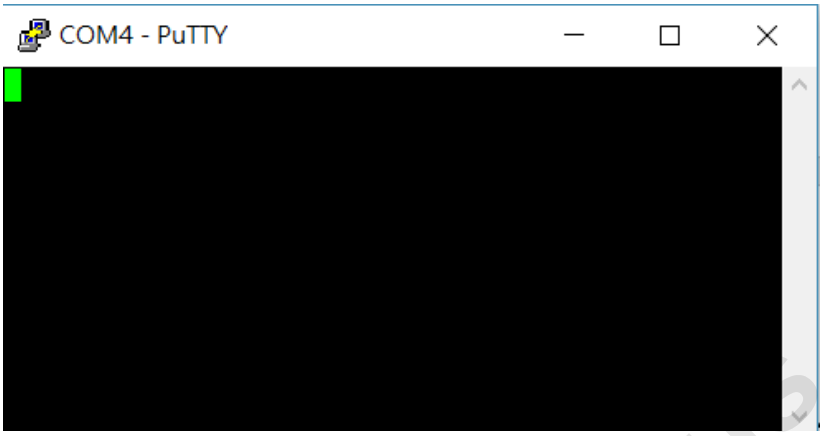


Figure, connecting 5V power

4. KL520 Power on and System

4.1 Bring Up procedure

1. Open UART COM port debug windows (Teraterm or Putty) /UART0: Baud rate: 115200



Figure, using teraterm or putty to see the UART message

2. Plug Micro USB then power on.

Figure, turn on power switch

3. Wake up chip from RTC power domain.

   You will see boot message when you press PTN button

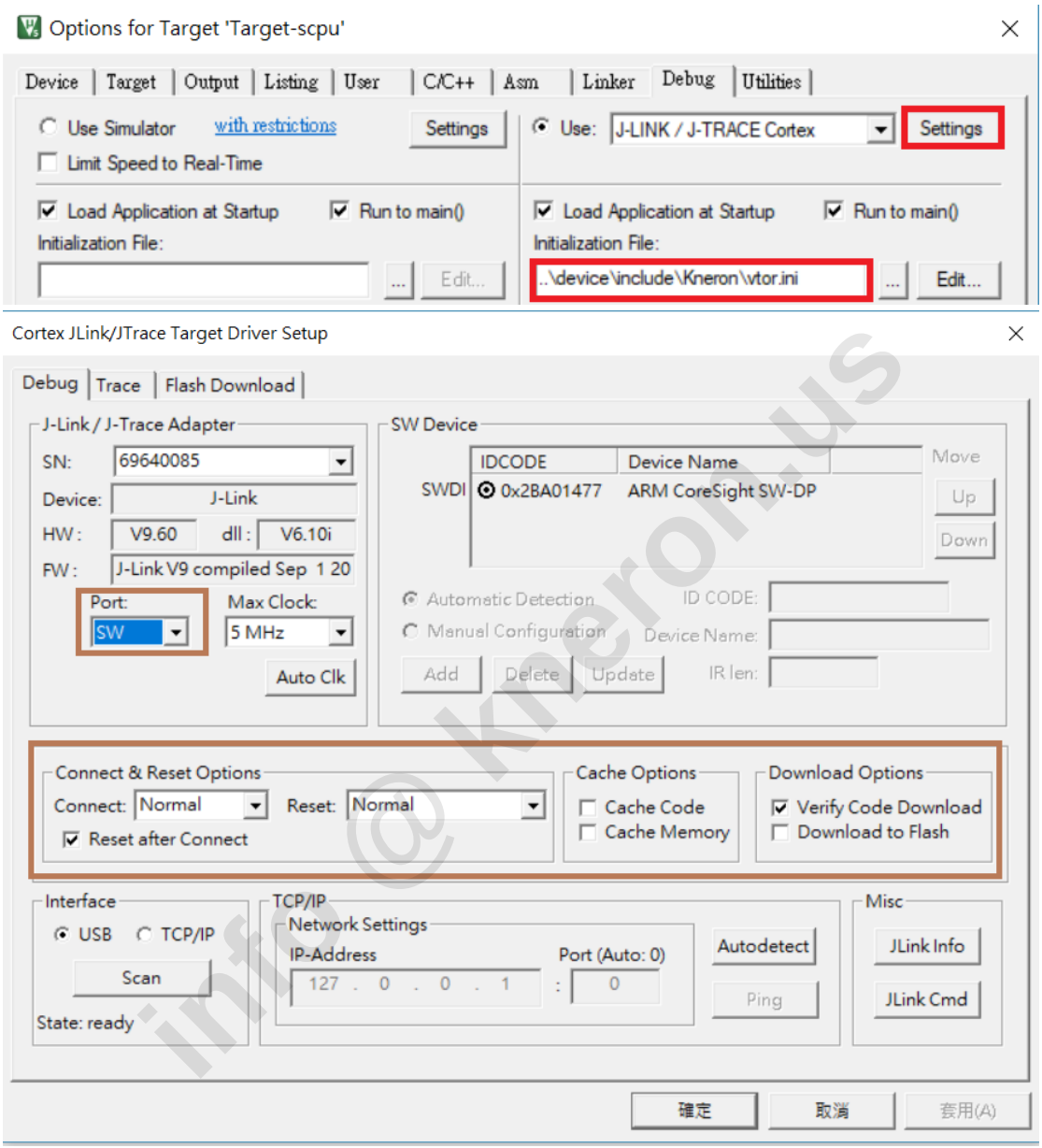
Figure, press the PTN and the message you'll see

4.2 Connecting JTAGs

Open KL520 Daisy-chain project.

On SCPU JLink Setting

Edit SCPU JTAG JLink Setting



Figure, SCPU JTAG JLink Setting