Intel® Edison

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Intel® Edison Front

with Kit for Arduino

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Intel® Edison Back

with Breakout Board

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Overview

Intel® Edison Module

The Intel® Edison module is a SoC (System on Chip) that includes an Intel® Atom™ 500MHz dual-core, dual-threaded CPU and an Intel® Quark™ 100MHz microcontroller.
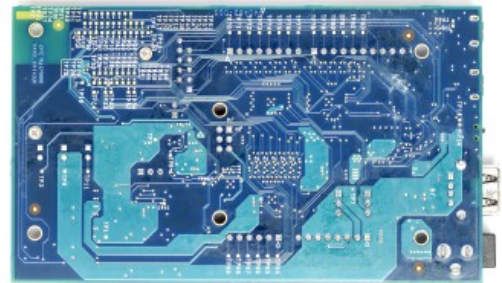
Key features:

- Integrated Wi-Fi, Bluetooth 4.0 LE;
- Support for Yocto Linux, Python, Node.js and Wolfram

Intel® Edison with Kit for Arduino

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*Intel® Edison Kit for Arduino Front*

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Intel® Edison Kit for Arduino Back

Intel® Edison Kit for Arduino provides the Arduino 1.0 pinout and standard connectors such as a micro USB connected to a UART, a USB OTG port that can be switched between a second micro USB device connector, a standard size USB host Type-A connector, a uSD card holder, and a DC power jack.

Like an Arduino Uno, the Intel® Edison Kit for Arduino makes possible to have provides 20 digital input/output pins, of which 6 can be used as analog inputs. The Intel® Edison has 4 PWM outputs which can be configured via jumpers to any of the 6 pins supporting PWM on the Arduino Uno (pins 3, 5, 6, 9, 10, or 11).

The Intel® Edison Kit for Arduino is designed to be hardware and software pin-compatible with Arduino shields designed for the Arduino Uno R3. Digital pins 0 to 13 (and the adjacent AREF and GND pins), Analog inputs 0 to 5, the power header, ICSP header, and the UART port pins (0 and 1), are all in the same locations as on the Arduino Uno R3.

The digital IOs and analog pins can be configured to operate at either 5V or 3.3V. The outputs can source or sink 24 mA at 3.3V and 32 mA at 5V.
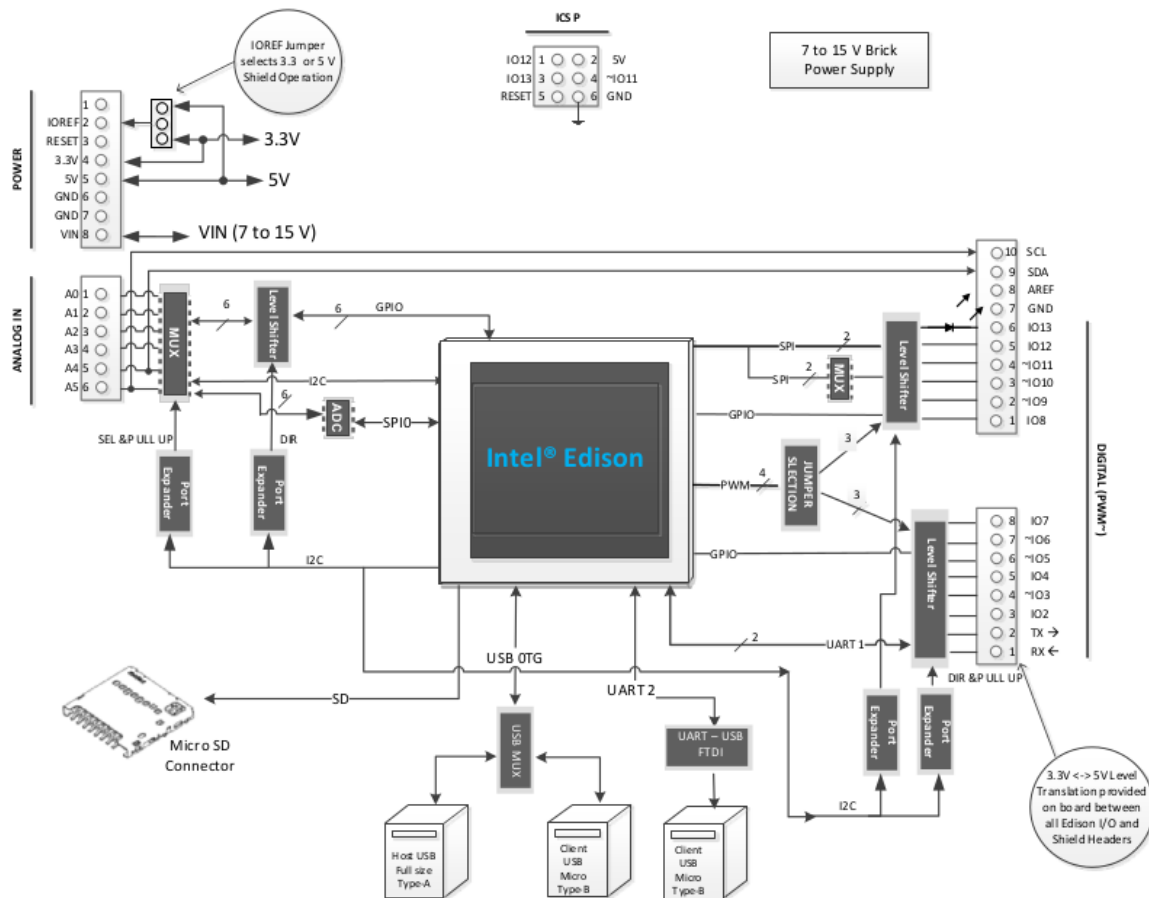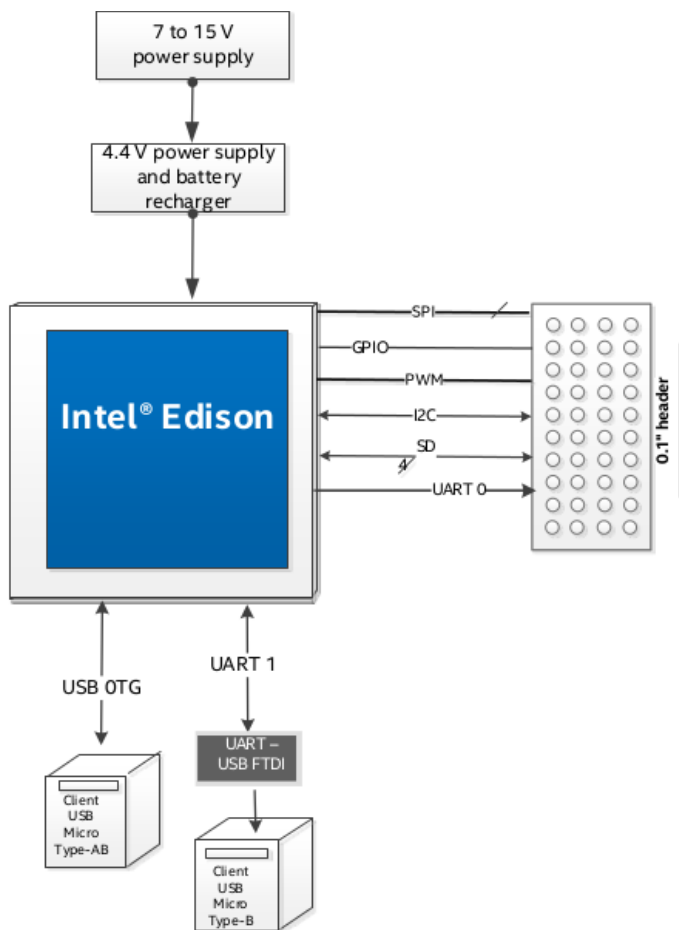
Intel® Edison with Breakout Board

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Intel® Edison Breakout Board Front

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Intel® Edison Breakout Board Back

The Intel® Edison Breakout Board is designed to expose the native 1.8V I/O of the Intel® Edison module. The board consists of power supply, battery recharger, USB OTG power switch, UART to USB bridge, USB OTG port, and I/O header.

7 to 15 V
power supply

4.4 V power supply
and battery
recharger

Intel® Edison

SPI
GPIO
PWM
I2C
SD
UART 0

0.1" header

UART 1

USB OTG

UART –
USB FTDI

Client
USB
Micro
Type-AB

Client
USB
Micro
Type-B

Summary

|	
SoC	Dual-core, dual-threaded Intel® Atom™ CPU and a 32-bit Intel® Quark™ microcontroller
Operating Voltage	1.8V (Breakouk Board)
	3.3V / 5V (Kit for Arduino
Input Voltage	7-15V (Both Breakout Board and Kit for Arduino
Digital I/O Pins	20 (of which 6 provide analog input and 4 provide PWM output) (Kit for Arduino)
Flash Storage	4 GB eMMC
RAM	1 GB LPDDR3 POP
Clock Speed	500 MHz (Intel® Atom™ CPU)
	100 MHz (Quark™ microcontroller)
Length	35.5mm (Edison)
	61mm (Breakout Board)
	127mm (Kit for Arduino)
Width	25mm (Edison)
	29mm (Breakout Board)
	72mm (Kit for Arduino)
Height	4mm (Edison)
	12mm (Breakout Board)
	12mm (Kit for Arduino)

Jumpers

Intel® Edison Breakout Board

-    J2 is the battery connector. If you want to power the breakout board with a rechargeable lithium-ion battery,

attach it to J2. (Refer to the figure for battery polarity.) When you attach a rechargeable lithium-ion battery, the breakout board will recharge the battery whenever power is applied via J21 or J22, or via J3 (when the board is attached to a USB host). Note that If you decide to use a battery pack on J2, we recommend a battery with a built-in thermistor. This thermistor should attach to the charger on

the breakout board. If you opt for the built-in thermistor, remove the jumper on J1 and connect the thermistor to the pin labeled THERM in the figure. If you choose not to use a battery with built-in thermistor, leave the jumper in place.)

- J3 is a micro USB FTDI serial-to-USB converter. The Linux console will output serial stream to this USB connector.

- J16 is a fully USB compatible, micro AB, OTG (power "on the go") port. If you plug a micro A cable into this port, the Intel® Edison module will connect to a PC as the host; if you plug a micro B cable into this port, the Intel® Edison module will connect to the PC as a device.

- For jumpers J17 through J20, the first pin on the left (the square one) is pin 1.
- J21 is the main power input. Apply 7 to 15 VDC with the polarity shown.
- J22 (on the bottom side of the board; see Figure 3) is for a power jack (not installed). You can purchase a 2.5 mm barrel jack and solder it to the bottom side of the board as shown in Figure 3. The input voltage to J22 is also 7 to 15 VDC.
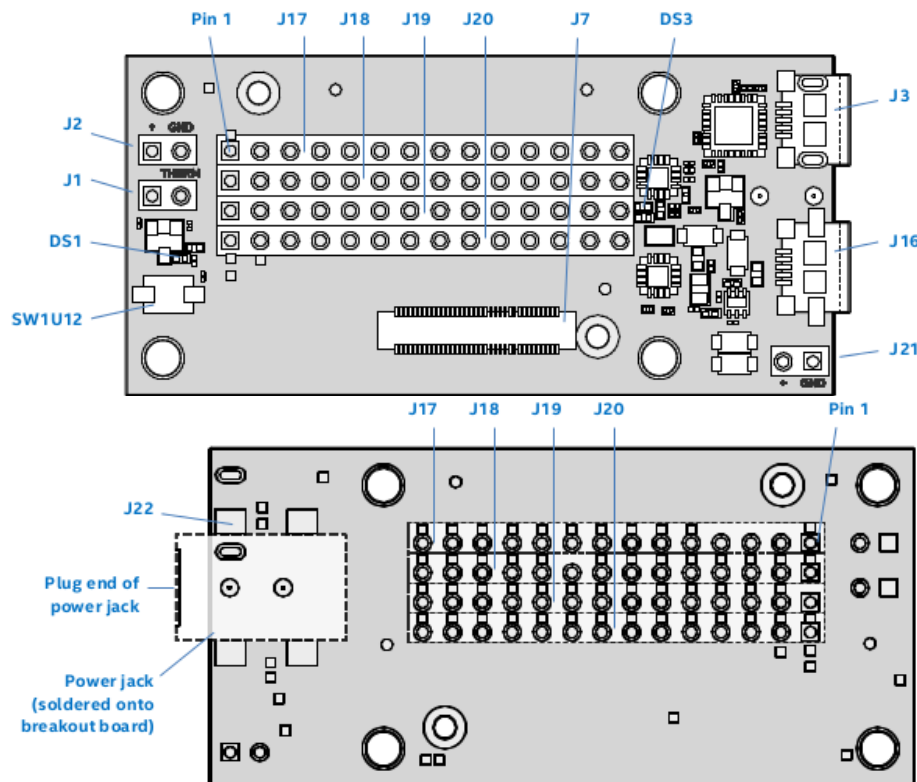
Intel® Edison Kit for Arduino

- J1 is the main power input. Apply 7 to 15 VDC with the positive center.
- J2 is the battery connector. If you want to power the breakout board with a rechargeable lithium-ion battery, attach it to J2. (Refer to the silk for battery polarity.) When you attach a rechargeable lithium-ion battery, the Kit for Arduino will recharge the battery whenever power is applied via J3 or J16, or via J1 (when the board is attached to a USB host).

- J11 & J12. There are four available GPIO that can be configured as PWM outputs This pin header arrangement allows the four PWM sources to be routed to any four of the six Arduino header pins. Figure 3 shows the PWM swizzler. Moving the PWM jumpers from the default configuration makes an I/O pin unavailable for use.
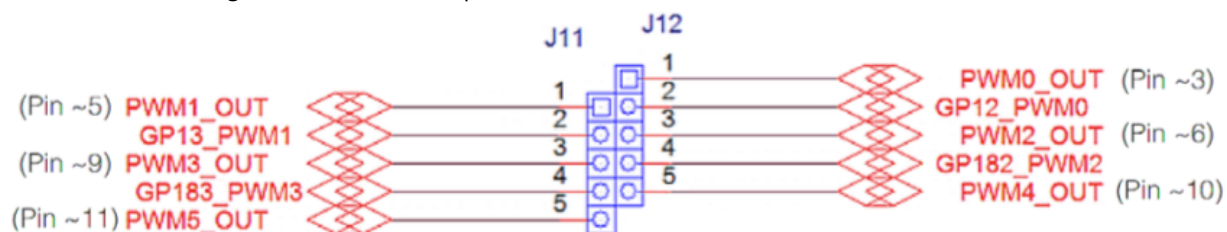
- J16 is a fully USB compatible, micro AB, OTG (power "on the go") port. If you plug a micro A cable into this

port, the Intel® Edison module will connect to a PC as the host; if you plug a micro B cable into this port, the Intel® Edison module will connect to the PC as a device.

Power

The Intel® Edison is a low-power device. In general, it does not draw more than 200 mA with 600 mA short duration spikes during Wi-Fi transmit. Therefore, an Intel® Edison device may run on USB power (when configured as a device), or an external power adapter from 7 to 15 V.

Power from the external power adapter goes to a DC-DC converter and down-converted to 5 V. This power goes to a battery recharger IC, which limits the output voltage to 4.4 V. This voltage is in the safe range for the Edison module VSYS. The VSYS power range is 3.15 to 4.5 V. This allows the Intel® Edison device to run off a standard lithium-ion battery.

Intel® Edison Breakout Board The on-boardcharger IC is configured to limit the current to 1 A. The charger is programmed to charge at 190 mA. This charger is designed to charge standard lithium-ion batteries with 4.2 V maximum charging voltage. You are responsible for choosing a suitable battery and following all safety precautions, to prevent overcharging or charging when the battery temperature is too high.

The drawback to this design is that the linear supply power drop places a limit on the total power through the Intel® Edison board and the 3.3 and 1.8 V supplies. The power loss through the charger will be (4.4 to 5 V) times current. In this case, you should attempt to limit average current through the Intel® Edison board and its power rails to approximately 0.75 A.

The recharger IC on the Intel® Edison breakout board has input current limit and overtemperature shutdown. Assure the end design does not trip these protection mechanisms. Some considerations of the power distribution in the Intel® Edison breakout board:

- USB host mode always requires use of an external power adapter.
- You are responsible for choosing a suitable battery and following all safety precautions, to prevent

overcharging or charging when the battery temperature is too high. The battery should be at least 300 mAH capacity, due to the 100 mA charging current. Intel recommends battery packs with internal protection circuits

Intel® Edison Kit for Arduino

The onboard charger IC is configured to detect the input power source and to limit the input power to either 500 mA (if connected to USB micro B port) or up to 1 A if connected to the DC power jack. he charger is programmed to charge at 100 mA. This charger is designed to charge standard lithium ion batteries with 4.2 V maximum charging voltage. End-users are responsible for choosing a suitable battery and following all safety precautions, to assure overcharging or charging when the battery temperature is too high is avoided. For low power applications (those shields running off 3.3 V) a lithium ion battery (3.0 to 4.3 Vmax) can be attached to J2, which will power the Intel® Edison kit for Arduino and provide 100 mA of 3.3 V to the shield. Some considerations of the power distribution in the Intel® Edison kit for Arduino:

- Due to the diode ORing of the 5 V DC/DC and the VBUS input, means the 5 V power to the shield header will

be nominally below 5 V. In the case of VBUS the voltage may be as low as 4.4 V (4.75 V VBUS min – 0.3 V diode drop. In the case of external power adapter 4.7 V.

- USB host mode always requires use of an external power adapter.

The power pins are as follows:

- VIN: The input voltage to the Intel board. You can access the voltage supplied via the power jack through this pin.
- 5V: This pin outputs a regulated 5V from the regulator on the board.
- 3.3V: A 3.3 volt supply generated by the on-board regulator. This regulator also provides the power supply to the Quark microcontroller.
- GND: Ground pins.
- IOREF: This pin on the Arduino board provides the voltage reference with which the microcontroller operates. This can be 3.3V or 5V based on the IOREF jumper position.

Buttons

Intel® Edison Breakout Board

The power button (SW1) is configured by software. Pressing and holding the power button will produce different results depending on the current state of the Intel® Edison compute module and the duration of the hold:

-    When the Intel® Edison device is completely powered down, pressing and holding the power button for

3 seconds will power up the device and boot up the Intel® Edison compute module.

-    When the Intel® Edison device is running, pressing and holding the power button for more than

2 seconds but less than 7 seconds will put the Intel® Edison device into AP (access point) mode. This action enables the "one-time setup" (same as configure_edison --enableOneTimeSetup).

-    When the Intel® Edison device is running, pressing and holding the power button for 10 seconds or

more will cause the Intel® Edison compute module to power down. This is similar to a hard shutdown, which cuts the power supply to the compute module.

Intel® Edison kit for Arduino

-    System reset. Pressing the system reset button (SW1UI5) will reset the Intel® Edison compute module, and

reset the I/O expanders, setting all the shield pins to high impedance state with no pullups.

-    Shield reset. Pressing the shield reset button (SW1UI1) will pull the shield signal reset to the active low

state. It does not affect the state of the Intel® Edison compute module or its I/O.

-    Power button. The power button (SW1UI2) is configured by software. Pressing and holding the power

button will produce different results depending on the current state of the Intel® Edison compute module and the duration of the hold: — When the Intel® Edison device is completely powered down, pressing and holding the power button for 3 seconds will power up the device and boot up the Intel® Edison compute module. — When the Intel® Edison device is running, pressing and holding the power button for more than 2 seconds but less than 7 seconds will put the Intel® Edison device into AP (access point) mode. This action enables the "one-time setup" (same as configure_edison --enableOneTimeSetup). — When the Intel® Edison device is running, pressing and holding the power button for 10 seconds or more will cause the Intel® Edison compute module to power down. This is similar to a hard shutdown, which cuts the power supply to the compute module.

Input and Output

Intel® Edison Breakout Board

Please refer to the hardware guide (http://download.intel.com/support/edison/sb/edisonbreakout_hg_331190006.pdf) for a complete overview of the board functionalities.

Intel® Edison kit for Arduino

-    Serial: 0 (RX) and 1 (TX). CTS and RTS is also available. Used to receive (RX) and transmit (TX) TTL serial data.
-    Digital I/O: Digital pins 0 through 13 and Analog pins A0 through A5 can be used as a digital input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They can operate at 3.3 or 5 volts.

Each pin can provide (source) or receive (sink) a current of 32mA @ 5v, or a current of 24mA@3.3V

-    PWM: 4 PWM channels are available, which can be configured via jumpers to any of digital pins 3,5,6,9,10, or 11
-    SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK), as well as the ICSP header
-    LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.
-    Analog Inputs: pins A0 through A5
-    SDA and SCL: Supports TWI or I2C communication

Communication

Intel® Edison Breakout Board

A complete overview about how to communicate with this board is given in this Intel Tutorial (https://communities.intel.com/docs/DOC-23878).

Intel® Edison kit for Arduino

All the communication methods listed above are valid. However the Intel® Edison Kit for Arduino has a number of facilities for communicating with a computer, another Edison, Arduino or other microcontrollers, and different devices like phones, tablets, cameras and so on.

It provides 2 UART Controllers : UART 1 to Arduino digital pins 0 and 1; UART 2 to a micro USB device connector; and a USB OTG port that can be switched between a second micro USB device connector or standard size USB host Type-A connector

The on-board microSD card reader is connected via an integrated SD controller and does not require the use of the SPI interface like other Arduino boards.

Programming

The Intel Edison can be programmed with this special version of the Arduino software (http://arduino.cc/en/main/software). It's possible to make requests of the Linux kernel with system() calls.

In order to get started with your board please visit our Getting Started Page (http://arduino.cc/en/Guide/IntelEdison)

Further documentation

For detailed documentation please refer to the Intel Documentation (http://www.intel.com/support/maker/edison.htm#documents). In order to get started with your board please visit the getting started page (//www.arduino.cc/en/Guide/IntelEdison)

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