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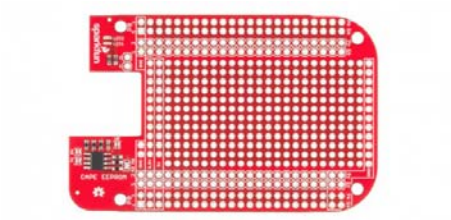
BeagleBone Black Proto Cape Hookup Guide

Board Overview



The BeagleBone Black Proto Cape is a great way to prototype or design custom capes for the BeagleBone Black. This cape gives you access to all gpio available on the BeagleBone Black. There are also two red LED's available for user applications. The included EEPROM lets the user prototype cape description files, which are used by the BeagleBoard Foundation to register boards.

Suggested Reading

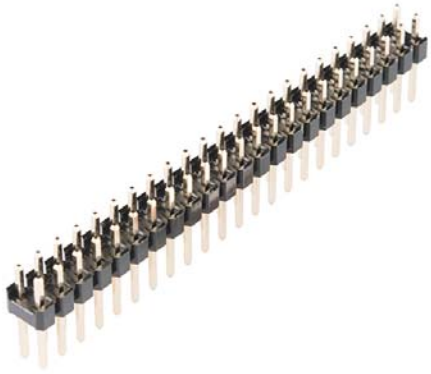
Before you start, we recommend the following background knowledge:

- How to Solder
- Working with Wire
- Logic Levels

Assembly

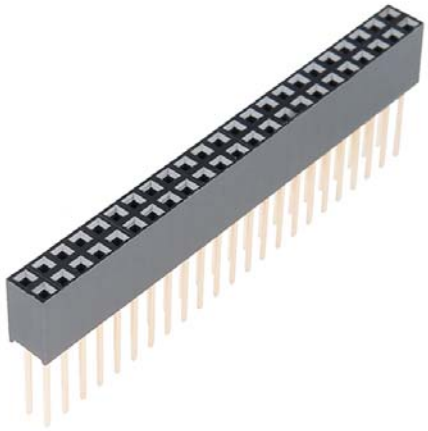
First let's solder some headers to the cape. There are two styles of headers you may choose from.

If you only plan on using one cape, straight headers will do just fine.



Header 2x23 (PRT-12791)

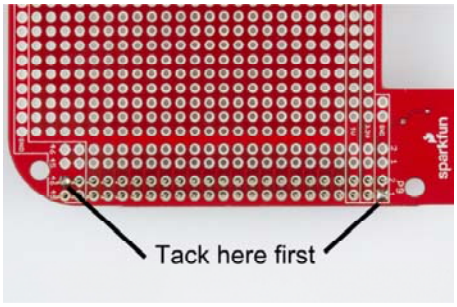
If you plan to use multiple capes, it is necessary to use stackable headers.



Stackable Header 2x23 (PRT-12790)

Soldering Headers

It is important when soldering the headers that they are held in straight. Tack two opposite pins and check the alignment before finishing the rest of the pins. When you are complete allow the cape to cool before inserting.

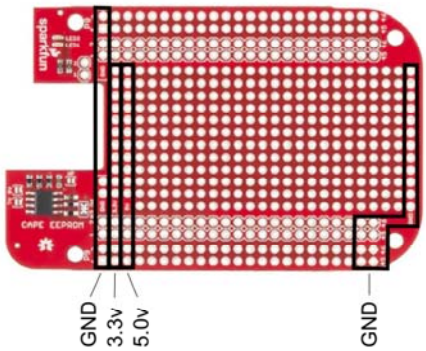


Removing capes can be quite difficult. Do not try to pull them off in one motion. Try to rock or slowly apply pressure to the corners. Separating in this fashion will prevent the pins from being bent.

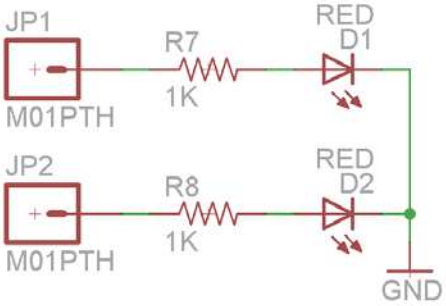
Let's take a look at how the prototyping area is laid out.

Proto Area

There is plenty of space on which to prototype. There are two power buses provided along with ground connections on both sides of the board, all .1" spaced through holes.



Two LED's have been provided for quick and easy debugging or general purpose use.



Simply apply a current to each LED to illuminate. They work with both 3.3v and 5v inputs.

Now, let's look at the EEPROM and its features.

Using the EEPROM

The Cape EEPROM is great for storing pin configuration data. The cape EEPROM is read by the BeagleBone Black during boot. It can then automatically setup the pins for use. There are several steps to understand how the EEPROM is used. For now, we will show you the possible settings available. The cape comes with a blank EEPROM.

Table 14. Expansion Board EEPROM

Name	Offset	Size (bytes)	Contents
Header	0	4	0xAA, 0x55, 0x33, 0xEE
EEPROM Revision	4	2	Revision number of the overall format of this EEPROM in ASCII "A1"
Board Name	6	32	Name of board in ASCII so user can read it when the EEPROM is dumped. Up to developer of the board as to what they call the board.
Version	38	4	Hardware version code for board in ASCII. Version format is up to the developer. i.e. 02.1…0A1…1A0
Manufacturer	42	16	ASCII name of the manufacturer. Company or individual's name.
Part Number	58	16	ASCII Characters for the part number. Up to maker of the board.
Number of Pins	74	2	Number of pins used by the daughter board including the power pins used. Decimal value of total pins 92 max, stored in HEX.
Serial Number	76	12	Serial number of the board. This is a 12 character string which is: WWYYAAAAnnnn where: WW = 2 digit week of the year of production YY = 2 digit year of production AAAA=Assembly code to let the manufacturer document the assembly number or product. A way to quickly tell from reading the serial number what the board is. Up to the developer to determine. nnnn = incrementing board number for that week of production
Pin Usage	88	148	Two bytes for each configurable pins of the 74 pins on the expansion connectors MSB LSB Bit order: 15 14……1..0 Bit 15……Pin is used or not……0=Unused by cape 1=Used by cape Bit 14-13……Pin Direction……1 0=Output 01=Input 11=BIDIR Bits 12-7……Reserved……should be all zeros Bit 6……Slew Rate……0=Fast 1=Slow Bit 5……Rx Enable……0=Disabled 1=Enabled Bit 4……Pull Up/Dn Select……0=Pulldown 1=PullUp Bit 3……Pull Up/Dn enabled……0=Enabled 1=Disabled Bits 2-0……Mux Mode Selection……Mode 0-7
VDD_3V3B Current	236	2	Maximum current in milliamps. This is HEX value of the current in decimal 1500mA=0x05 0xDC 325mA=0x01 0x45
VDD_5V Current	238	2	Maximum current in milliamps. This is HEX value of the current in decimal 1500mA=0x05 0xDC 325mA=0x01 0x45
SYS_5V Current	240	2	Maximum current in milliamps. This is HEX value of the current in decimal 1500mA=0x05 0xDC 325mA=0x01 0x45
DC Supplied	242	2	Indicates whether or not the board is supplying voltage on the VDD_5V rail and the current rating 000=No 1-0xFFFF is the current supplied storing the decimal equivalent in HEX format
Available	244	32543	Available space for other non-volatile codes/data to be used as needed by the manufacturer or SW driver. Could also store presets for use by SW.

The default address for the EEPROM is 0x57. You can change it to addresses 0x54 - 0x57 with the selection of the two address jumpers. They are Labled A0 and A1. Changing the address of the Cape is important when you are using multiple capes.

Address Table

A2	A1	A0	7-bit address
1	0	0	0x54
1	0	1	0x55
1	1	0	0x56
1	1	1	0x57

Once you have created your next great thing you can register your settings with the BeagleBone foundation. This registration allows them to upload your settings to the latest operating system available. This removes the need for users to setup their board to use your cape.

Resources and Going Further

Now, go forth and build something awesome! Here are some additional links to get you started using the BeagleBone Black.

Further reading:

- BeagleBone Black Homepage
- Bone Script Library Support

If you have any problems or questions, our technical support department can help. Please don't hesitate to contact us. We also love to hear about your projects!