PRELIMINARY RELEASE | RELEASE DATE: JAN. 2010

C3038 CAMERA MODULE

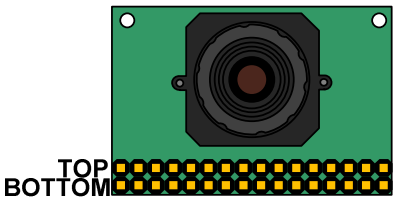
FEATURES

- 101,376 pixels, 1/4" lens, CIF/QCIF format
- Progressive scan read out
- Data format - YCrCb 4:2:2, GRB 4:2:2, RGB Raw Data
- 8/16 bit video data: ITU-601, ITU-656, ZV port
- Wide dynamic range, anti-blooming, zero smearing
- Electronic exposure/gain/white balance control
- Image enhancement - brightness, contrast, gamma, saturation, sharpness, window, etc.
- Internal/external synchronization
- Frame exposure/line exposure option
- 3.3-Volt operation, low power dissipation
  - < 20 mA active power
  - < 10 µA in power-save mode
- Gamma correction (0.45/0.55/1.00)
- I2C programmable (400 kb/s):
- Colour saturation, brightness, contrast, white balance, exposure time, gain

MODULE SPECIFICATIONS

Imager	OV6630, CMOS colour image sensor
Array Size	356 X 292 pixels
Pixel size	9 X 8.2 µm
Scanning	Progressive
Effective image area	3.1mm x 2.5mm
Electronic Exposure	500:1
Gamma Correction	0.45/0.55/1.0
S/N Ratio	>48dB
Min Illumination	3lux @F1.2
Operation Voltage	3.3 VDC
Operation Current	<20mA Active ; 10 µA Standby

MODULE PINOUT

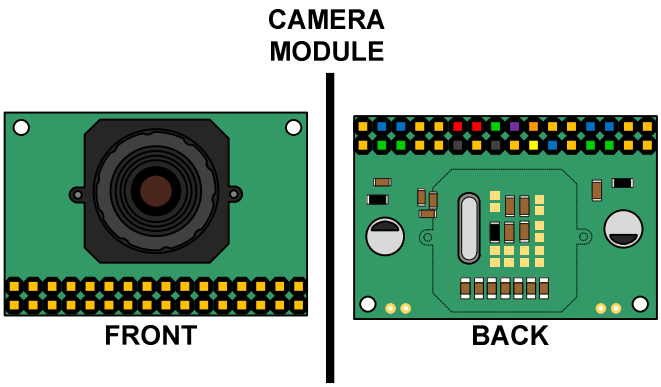


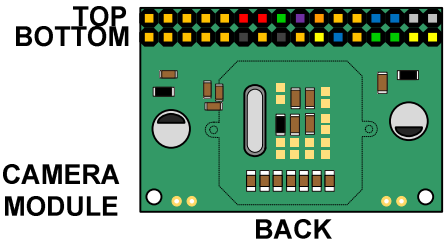
TOP	GND	UV6	UV4	UV2	UV0	AGND	EXCLK	AGND	AGND	SCL	SDA	PWDN	Y6	Y4	Y2	Y0
BOTTOM	VTO	UV7	UV5	UV3	UV1	VCC	VCC	PCLK	VSYN	HREF	FODD	RST	Y7	Y5	Y3	Y1

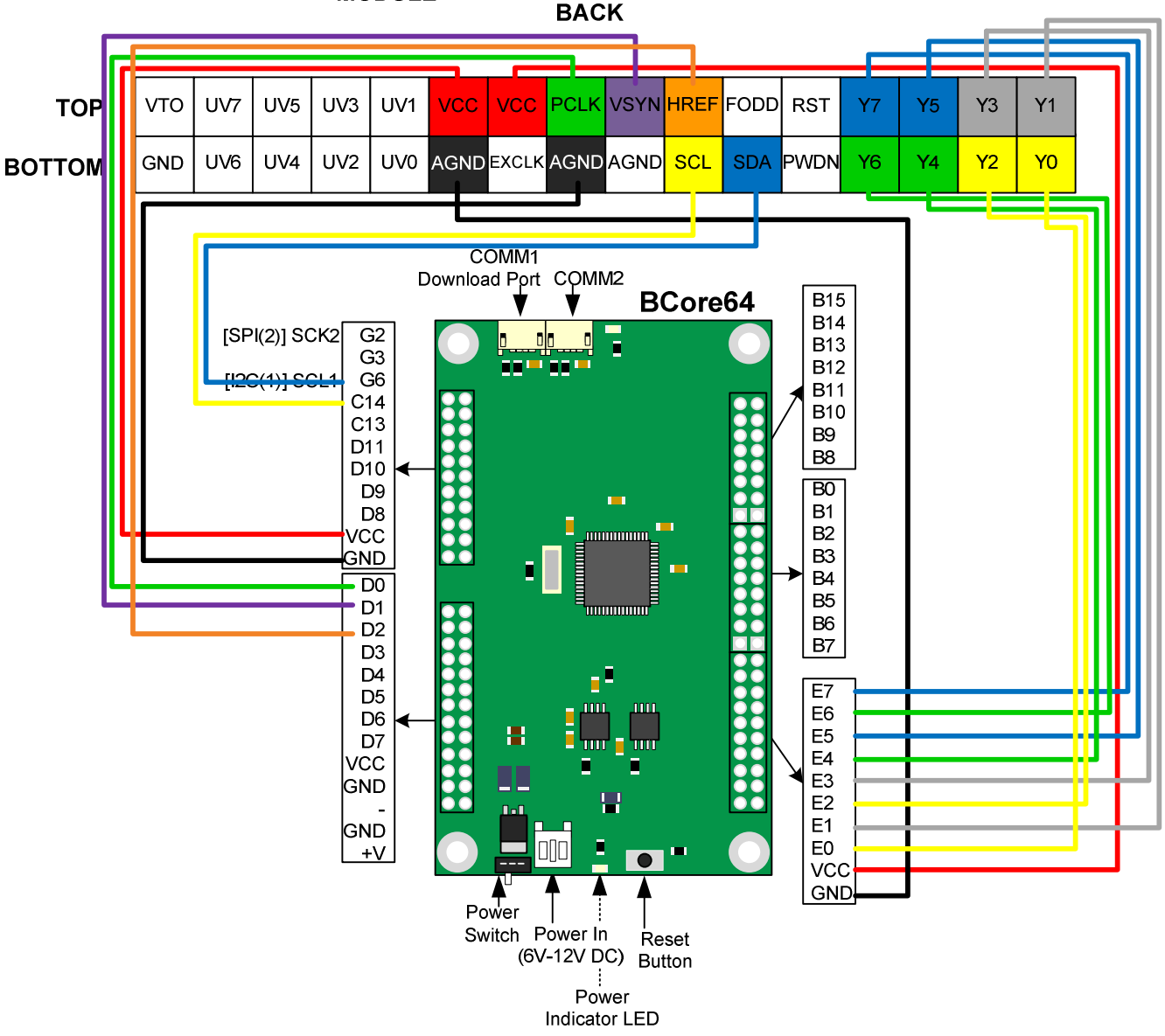
CAMERA MODULE PIN DESCRIPTION

PIN REP.	PIN DESCRIPTION
Y0-Y7	Digital output Y Bus.
PWDN	Power down mode
RST	Reset
SDA	I2C Serial data
FODD	Odd Field flag
CL	I2C Serial clock input
HREF	Horizontal window reference output
AGND	Analogue Ground
VSYN	Vertical Sync output
PCLK	Pixel clock output
EXCLK	External clock input (need to remove crystal)
VCC	Power Supply 3.3VDC
UV0-UV7	Digital output UV bus
GND	Common ground
VTO	Video Analogue Output (75Ω monochrome)

INTERFACING A BCORE64 TO THE CAMERA MODULE



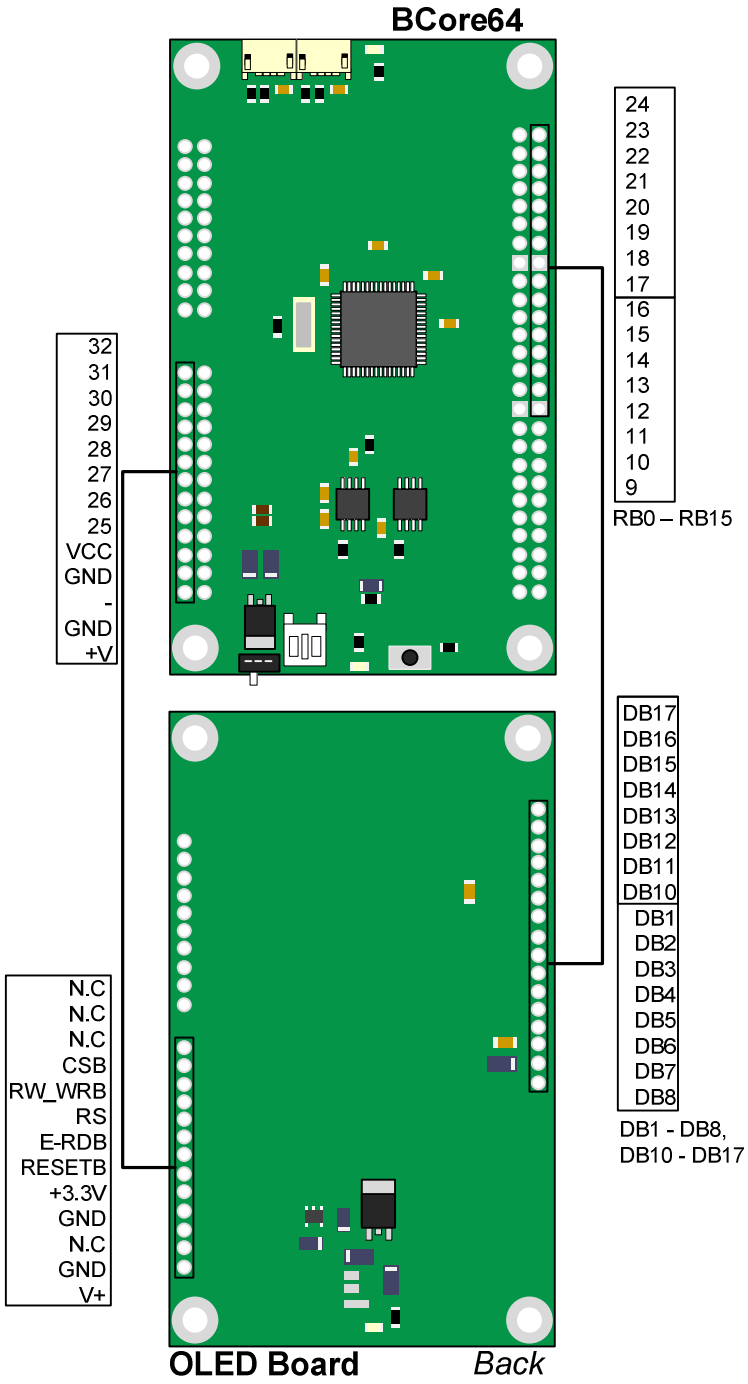




INTERFACING A BCORE64 TO THE OLED BOARD (STACKABLE)

The BCore Board/s should stack directly onto the back of the OLED board (so that the OLED faces outwards) with the pins nicely lined up. Connections are illustrated in the figure below.

Note: The current configuration used for the BlazingCore Vision System requires that the Camera is connected by wire, and the OLED Board is then stacked to the BCore64 Board using standard gold pin headers and sockets. (Only a couple of I/Os will be left after connecting everything up, and all remaining I/Os are digital.)
*For more information on the OLED Board, please refer to our 2.83" OLED Display Datasheet.
http://www.aiscube.com/main/BlazingCore/Download/AMOLED_Datasheet.pdf



PROGRAMMING EXAMPLE/S

The Camera Module must be initialised before any frame grabbing can be done.
Using the camera library built onboard the BCore OS, users are given access to the OV6630 Chip Registers for settings to be made. In the code examples that follow, 3 registers are accessed in OV6630 to configure settings for the initialising stage; *Clock Rate Control, Common Control A, and Common Control B.*

TABLE DESCRIPTION OF OV6630 I²C REGISTER SET *

*For more information please refer to OV6630 Datasheet: http://datasheet.digchip.com/341/341-00015-0-OV6130.pdf

Sub-Address (HEX)	Register	Default (HEX)	Read/ Write	Description
11	CLKRC	00	RW	**Clock Rate Control** CLKRC[7:6] – Sync output polarity selection "00" – HSYNC=Neg, CHSYNC=Neg, VSYNC=Pos "01" – HSYNC=Neg, CHSYNC=Neg, VSYNC=Neg "10" – HSYNC=Pos, CHSYNC=Neg, VSYNC=Pos "11" – HSYNC=Pos, CHSYNC=Pos, VSYNC=Pos CLKRC[5:0] – Clock pre-scaler CLK = (MAIN_CLOCK / ((CLKRC[5:0] + 1) × 2)) / n Where n=1 if register [3E], COMO<7> is set to "1" and n=2 otherwise.
12	COMA	24	RW	**Common Control A** COMA[7] – SRST, "1" initiates soft reset. All registers are set to default values and chip is reset to known state and resumes normal operation. This bit is automatically cleared after reset. COMA[6] – MIRR, "1" selects mirror image COMA[5] – AGCEN, "1" enables AGC, COMA[4] – Digital output format, "1" selects 8-bit: Y U Y V Y U Y V COMA[3] – Select video data output: "1" - select RGB, "0" - select YCrCb COMA[2] – Auto white balance "1" - Enable AWB, "0" - Disable AWB COMA[1] – Color bar test pattern: "1" - Enable color bar test pattern COMA[0] – Reserved
13	COMB	01	RW	**Common Control B** COMB[7:6] – Reserved COMB[5] - Select data format. "1" - select 8-bit format, Y/CrCb and RGB is multiplexed to 8-bit Y bus, UV bus is tri-stated, "0" - select 16-bit format COMB[4] – "1" - enable digital output in ITU-656 format COMB[3] – CHSYNC output. "1" - horizontal sync, "0" - composite sync COMB[2] – "1" – Tri-state Y and UV busses. "0" - enable both busses COMB[1] – "1" - Initiate single frame transfer. COMB[0] – "1" - Enable auto adjust mode.

WRITEREG

Write to Register.

`CAM.WRITEREG(`*Register Address, Value*`)`

Code:

```
01.  PUBLIC SUB MAIN()
02.  'Init Camera Module
03.  CAM.WRITEREG(18, 128) 'Common Control A 0x12
04.  DELAY(200)
05.  CAM.WRITEREG(18, 64+32+16+8+4)
06.  DELAY(200)
07.  CAM.WRITEREG(17, 6) 'SPEED - DONT CHANGE 0x11
08.  CAM.WRITEREG(19, 32+1) 'Common Control B 0x13
09.  END SUB
```

GRABFRAME

Grabs a single frame from the camera module and writes it directly to the OLED's GRAM for display.

```
CAM.GRABFRAME()
```

Code:

```
01.  PUBLIC SUB MAIN()
02.  'Init Camera Module
03.  CAM.WRITEREG(18, 128) 'Common Control A 0x12
04.  DELAY(200)
05.  CAM.WRITEREG(18, 64+32+16+8+4)
06.  DELAY(200)
07.  CAM.WRITEREG(17, 6) 'SPEED - DONT CHANGE 0x11
08.  CAM.WRITEREG(19, 32+1) 'Common Control B 0x13
09.  DO
10.     CAM.GRABFRAME()
11.  LOOP
12.  END SUB
```

NOTE/S:

The BlazingCore Vision System is meant to be used together with the OLED display to make use of its high speed GRAM memory, thus eliminating the use of another external memory to store the frame(~140k). Data manipulation is done by reading the pixel data of a specific location from the GRAM into a variable stored in program memory. Of course, the OLED has to be initialised as well.

A full length code demonstrating capturing frames from the camera and displaying them on the OLED is shown below. Frame-grabbing and displaying to screen is currently done at 10 to 12 frames a second.

Code:

```
01.  PUBLIC SUB MAIN()
02.  'Init OLED
03.  OLED_INIT()
04.
05.  'Init Camera Module
06.  CAM.WRITEREG(18, 128) 'Common Control A 0x12
07.  DELAY(200)
08.  CAM.WRITEREG(18, 64+32+16+8+4)
09.  DELAY(200)
10.  CAM.WRITEREG(17, 6) 'SPEED - DONT CHANGE 0x11
11.  CAM.WRITEREG(19, 32+1) 'Common Control B 0x13
12.  DO
13.     CAM.GRABFRAME()
14.  LOOP
15.
16.  END SUB
17.
18.  '================================================
19.  PUBLIC SUB OLED_INIT()
20.  OLED.INIT(0)
21.  OLED.SETCOLOUR.FOREGROUND(31)
22.  OLED.PRINT "TEST"
23.  END SUB
24.  '================================================
```

NOTES

LATEST DOCUMENTATION

All our documentations are constantly updating to provide accurate and/or new information that we feel would help you with developing with our products.

The latest documentation may be obtained from our website: www.aiscube.com

HOW YOU CAN HELP

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