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Controller Board

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CBC-2 01

CBC-2 02

## Data Sheet

**Introduction:**

GEMboard™ (CBC-2) is a production display controller board for many popular LCD panels ranging from 5.7" to 10.4" with resolutions up to 640x480 (VGA). GEMboard™ affords greater speed in prototyping, maximizes design flexibility while shortening the time to market. GUI integration has never been easier. The GEMboard™ contains the complete bill of material including support for backlight (LED or CCFL) and touch panels.

**Features:**

- Amulet AGB75LC04-QU-E 208 PQFP GEM Graphical OS Chip™
- Storage Capacity – 32megabit Serial Flash for storing GUI pages
- 64megabit SDRAM (frame buffer)
- Integrated resistive 4 or 5 wire touch panel decoder, multiple touch panel connections (auxiliary pads/ headers) plus dedicated connectors
- Multiple Serial Interfaces – 3.3v UART, TWI & USB
- 33 pin FPC connector with auxiliary pad for 31pin FPC
- Backlight Support - LED backlight circuit with PWM, optional headers with dedicated connectors. Dedicated CCFL backlight header for inverters w/ PWM control
- Touch Panel calibration feature with dedicated switch and/or software
- Two boards to choose from (-01 and -02) depending on backlight power requirement

## Backlight Current

CBC-2 01	Backlight 200mA Output
CBC-2 02	Backlight 75mA Output

## Electrical Characteristic

### 3.1 Recommended Operating Conditions

MIN - MAX 4.75V - 10V	5V Recommended
5V Current	1A

### 3.2 DC Characteristics

V core Supply Current	22mA @1.2V
V input Low Level	-0.3 to 0.8V
V input High Level	2V to (Vcc + 0.3V )
Pull Up Resistors	70K to 175KOhms
IO Output Current	8mA
Static Current Excluding Power on Reset V core = 1.2V	600uA
Static Current Logic cells consumption, including Power on Reset and all input drivers V core = 1.2V	30uA

Pin #	Signal	Type
1	VLED+	O
2	VLED+	O
3	VLED+	O
4	VLED-	O
5	VLED-	O
6	VLED-	O

**Table 1. J1A Connector**

Pin #	Signal	Type
1	VLED+	O
2	VLED-	O
3	VLED+	O
4	VLED-	O
5	VLED+	O
6	VLED-	O
7	VLED+	O
8	VLED-	O

**Table 2. J1B Connector**

## Pin Descriptions

**Pin Type**

**I = Input**

**O = Output**

**P = Power Supply**

Pin #	Signal	Type	Description
1	GND	P	Ground
2	PC	O	Pixel Clock
3	Hsync	O	Hsync Signal
4	Vsync	O	Vsync Signal
5	GND	P	Ground
6	Pixel Data 2	O	R2
7	Pixel Data 3	O	R3
8	Pixel Data 4	O	R4
9	Pixel Data 5	O	R5
10	Pixel Data 6	O	R6
11	Pixel Data 7	O	R6
12	GND		Ground
13	Pixel Data 10	O	G2
14	Pixel Data 11	O	G3
15	Pixel Data 12	O	G4
16	Pixel Data 13	O	G5
17	Pixel Data 14	O	G6
18	Pixel Data 15	O	G7
19	GND	P	Ground
20	Pixel Data 18	O	B2
21	Pixel Data 19	O	B3
22	Pixel Data 20	O	B4
23	Pixel Data 21	O	B5
24	Pixel Data 22	O	B6
25	Pixel Dara 23	O	B7
26	GND	P	Ground
27	OE	O	Output Enable
28	3.3V	P	3.3V
29	3.3V	P	3.3V
30	NC	-	B7
31	SW1	O	3.3V / Ground

**Table 3. J2 connector DF9A-31P-1V**

Pin #	Signal	Type	Description
1	GND	P	Ground
2	PC	O	Pixel Clock
3	Hsync	O	Hsync Signal
4	Vsync	O	Vsync Signal
5	GND	P	Ground
6	Pixel Data 2	O	R2
7	Pixel Data 3	O	R3
8	Pixel Data 4	O	R4
9	Pixel Data 5	O	R5
10	Pixel Data 6	O	R6
11	Pixel Data 7	O	R6
12	GND		Ground
13	Pixel Data 10	O	G2
14	Pixel Data 11	O	G3
15	Pixel Data 12	O	G4
16	Pixel Data 13	O	G5
17	Pixel Data 14	O	G6
18	Pixel Data 15	O	G7
19	GND	P	Ground
20	Pixel Data 18	O	B2
21	Pixel Data 19	O	B3
22	Pixel Data 20	O	B4
23	Pixel Data 21	O	B5
24	Pixel Data 22	O	B6
25	Pixel Dara 23	O	B7
26	GND	P	Ground
27	OE	O	Output Enable
28	3.3V	P	3.3V
29	3.3V	P	3.3V
30	SW3	O	3.3V / Ground
31	SW7	O	3.3V / Ground
32	SW8	O	3.3V / Ground
33	GND	P	Ground

**Table 4. J3 Connector FH12-33S-0.5SH**

Pin #	Signal	Type	Description
1	VLED+	O	
2	VLED+	O	
3	VLED-	O	
4	VLED-	O	

**Table 5. J4 Header**

Pin#	Signal	Type	Description
1	GND	P	Ground
2	5V	P	5V @ 500mA

**Table 6. J5 Connector**

Pin #	Signal	Type	Description
1	5V	P	Ground
2	PWM0	O	
3	GND	P	Ground
4	NC	-	

**Table 7. J6 Header**

Pin #	Signal	Type	Description
1	Y-	I	
2	X+	I	
3	Y+	I	
4	X-	I	

**Table 8. J8 Header**

Pin#	Signal	Type	Description
1	5V	P	Voltage In 5V +/- 10% @ 1A
2	5V	O	Voltage In 5V +/- 10% @ 1A
3	GND	O	Ground
4	GND	O	Ground
5	SCL	O	Serial Clock
6	SDA	O	Serial Data
7	COMMU RXD	O	CommU RXD UART
8	COMMU TXD	O	CommU TXD UART
9	PWM1	O	Programmable Clock 1
10	PWM2	O	Programmable Clock 2
11	PROG M	O	Program Mode Float = Program GND = Run
12	PWM0	O	Programmable Clock 0
13			
14	T_CAL	O	Touch Panel Calibration Float = Normal GND= Cal
15	PROGU RXD	O	ProgU RXD UART
16	PROGU TXD	O	ProgU TXD UART
17	SPI C3	O	SPI Chip Select
18			
19	SPI C2	O	SPI Chip Select
20		O	
21	MOSI	O	SPI Data OUT
22	SCLK	O	SPI Clock
23	RESET	O	System Reset by driving this pin low
24	MISO	O	SPI Data IN

**Table 9. J9 Con, 24pin, header, 2mm , Hirose DF-11-24DP-2DSA**

Pin#	Description
1	N/C
2	TX (Amulet GUI module transmits data on Pin 2 while the PC receives data on Pin 2)
3	RX (Amulet GUI module receives data on Pin 3 while the PC transmits data on Pin 3)
4	Pin 4 to 6 - Jumpered
5	Ground
6	Pin 4 to 6 - Jumpered
7	Pin 7 to 8 - Jumpered
8	Pin 7 to 8 - Jumpered
9	N/C

**Table 10. J10 Connector**

Pin #	Signal	Type	Description
1	X-	I	
2	Y+	I	
3	X+	I	
4	Y-	I	

**Table 11. J11 Connector**

Pin #	Signal	Type	Description
1	VBUS	I	
2	DDM		
3	DDP		
4			
5	GND	P	Ground

**Table 12. J12 Connector**

Pin #	Signal	Type	Description
1	Y-	I	
2	X-	I	
3	Y+	I	
4	X+	I	

**Table 13. J13 Connector**

Pin #	Signal	Type	Description
1	Y-	I	
2	X+	I	
3	Y+	I	
4	X-	I	

**Table 15. J14 Connector**

Pin#	Signal	Type	Description
1	LED+	O	
2	LED-	O	

**Table 15. J15 and J16 Connector**

Pin #	Signal	Type	Description
1	X+	I	
2	X+	I	
3	Y+	I	
4	Y+	I	
5	X-	I	
6	X-	I	
7	Y-	I	
8	Y-	I	

**Table 16. JP10 Connector**

JS #	Signal	Type	Description
JS1 1	COMMU TXD		
JS1 2	TXD Transceiver		
JS1 3	PROGU TXD		
JS2 1	COMMU RXD		
JS2 2	RXD Transceiver		
JS2 3	PROGU RXD		

**Table 17. JS1 / JS2**

SW #	Signal	Type	Description
SW3	R / L	O	3.3V / Ground J3
SW6 1	PROG M	I	
SW6 2	TPC	I	
SW7	U /D	O	3.3V / Ground J3
SW8		O	3.3V /Ground / Open J3
SW9		O	Ground / Open J1
SW11		O	3.3V / Ground J2

**Table 18. Switches**

Backlight current / Max Voltage adjust

$$( 1.5 \times V_{out} / 1.23 - 1 ) \times 10K = R23 \quad \text{Max Voltage Out}$$

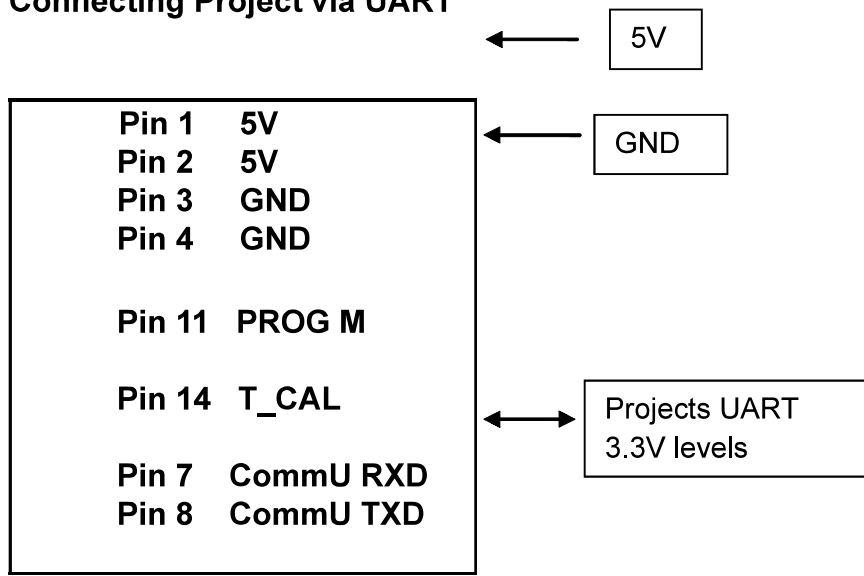
$$0.200 / I_{LED} = R20 - R22 \quad \text{LED Current}$$

**Warning supplying to much current to the LED backlight will shorten the life of the LEDs.**



## J9 typical Connection

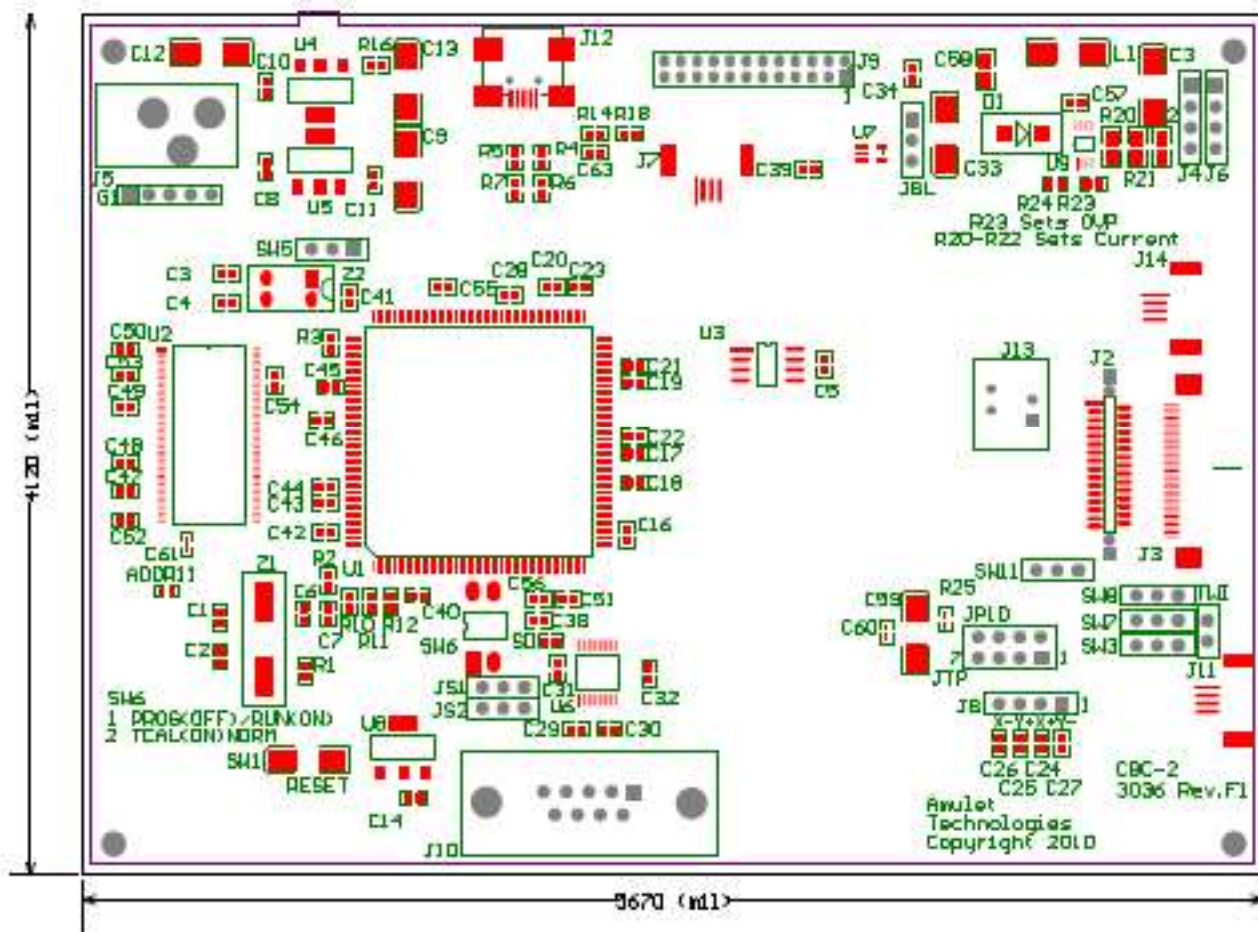
### Connecting Project via UART



J9

**Note:** Cut jumper SD by U6 Jumper “D” side to C38 “8” side GND to take the RS232 Transceiver out of circuit.

### 5. Dimensions



Mounting Holes 3mm    136.6mm by 96.4mm





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