INTELLIGENT
DISPLAY SOLUTIONS

256x128 COG Graphic Modules

CI064-4073-XXX

Overview

IDS have introduced an unprecedented array of technologies and backlight colours to enhance your product design.

Utilising our 256x128 COG module, designers can now have the flexibility to develop a product with the style and look they need, including an RGB option.

We also support this product with Arduino and Pi code, breakout boards and demos to make implementation as quick as possible.

Technical Features

Format : 256x128 Dot

Various LCD modes : STN Positive, STN Negative, FSTN Positive, FSTN Negative, FFSTN Negative

Various LED Backlight Colour : White, Green, Blue, Orange, Yellow/ Green, RGB

Viewing direction : 6 o'clock

Driving scheme : 1/65 Duty cycle, 1/9 Bias

Low power operation

Power supply voltage range (VDD): 2.4 to 3.3V

Easy interface with 8 bit parallel or serial

On-Chip DC/DC Converter

Internal Contrast Control

Built-in temperature compensation

Module size : 80.30mm(L) x 43.86mm(W) (not included 105.5mm FPC length)

Viewing area : 66.41mm(L) x 31.00mm(W)

Active area : 57.58mm(L) x 27.51mm(W)

Dot pitch : 0.225mm(L) x 0.215mm(W)

Dot size : 0.21mm(L) x 0.20mm(W)

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DATASHEET

Accessories

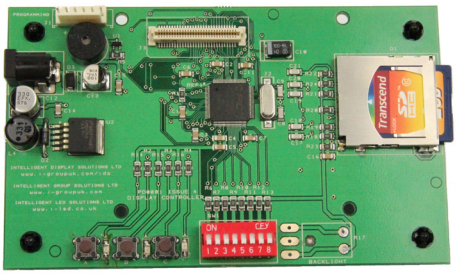
Break-Out Board

We have designed a break-out board for our CI064-4073-xx range of standard COG displays.

The IDB-CI064-4073-xx-xx. enables our CI064-4073-xx COG displays to be used with the industry standard 0.1" header, with all secondary components added, only the important connections are brought out.

Development System

We have designed a development system to make choosing and developing with our displays as simple as possible. Images are loaded via an SD card in a simple bitmap format, with on board controls of time between image, contrast, brightness and touch control (where applicable) you can within minutes start to see what your application will look like on the target display.



Product Options

Part Number	Description	Colour
CI064-4073-11	STN Positive Transflective	White Backlight
CI064-4073-12	STN Positive Transflective	Green Backlight
CI064-4073-13	STN Positive Transflective	Blue Backlight
CI064-4073-14	STN Positive Transflective	Amber Backlight
CI064-4073-15	STN Positive Transflective	RGB Backlight
CI064-4073-16	STN Positive Transflective	Red Backlight
CI064-4073-28	STN Positive Reflective	Reflective
CI064-4073-01	FSTN Positive Transflective	White Backlight
CI064-4073-03	FSTN Positive Transflective	Green Backlight
CI064-4073-02	FSTN Positive Transflective	Blue Backlight
CI064-4073-04	FSTN Positive Transflective	Amber Backlight
CI064-4073-07A	FSTN Positive Transflective	RGB Backlight
CI064-4073-17	FSTN Positive Transflective	Red Backlight
CI064-4073-29	FSTN Positive Reflective	Reflective
CI064-4073-05	STN Negative Blue Transmissive	White Backlight
CI064-4073-18	FSTN Negative Transmissive	White Backlight
CI064-4073-19	FSTN Negative Transmissive	Green Backlight
CI064-4073-20	FSTN Negative Transmissive	Blue Backlight
CI064-4073-21	FSTN Negative Transmissive	Amber Backlight
CI064-4073-22	FSTN Negative Transmissive	RGB Backlight
CI064-4073-23	FSTN Negative Transmissive	Red Backlight
CI064-4073-06	FFSTN Negative Transmissive	White Backlight
CI064-4073-24	FFSTN Negative Transmissive	Green Backlight
CI064-4073-25	FFSTN Negative Transmissive	Blue Backlight
CI064-4073-26	FFSTN Negative Transmissive	Amber Backlight
CCI064-4073-08A	FFSTN Negative Transmissive	RGB Backlight

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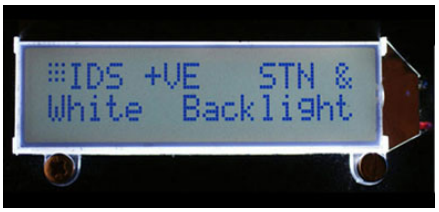
STN



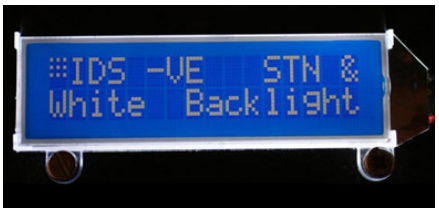
STN White LED Backlight

STN Red LED Backlight

STN Amber LED Backlight

STN Green LED Backlight

STN Blue LED Backlight



STN RGB LED Backlight

STN Reflective

FSTN Positive

FSTN Positive White LED Backlight

FSTN Red LED Backlight

FSTN Amber LED Backlight

FSTN Green LED Backlight

FSTN Blue LED Backlight

FSTN RGB Backlight

FSTN Reflective

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FSTN Negative

FSTN Negative White LED Backlight

FSTN Negative Red LED Backlight

FSTN Negative Amber LED Backlight

FSTN Negative Green LED Backlight

FSTN Negative Blue LED Backlight

FSTN Negative RGB LED Backlight

FFSTN

FFSTN Negative White LED Backlight

FFSTN Negative Red LED Backlight

FFSTN Negative Amber LED Backlight

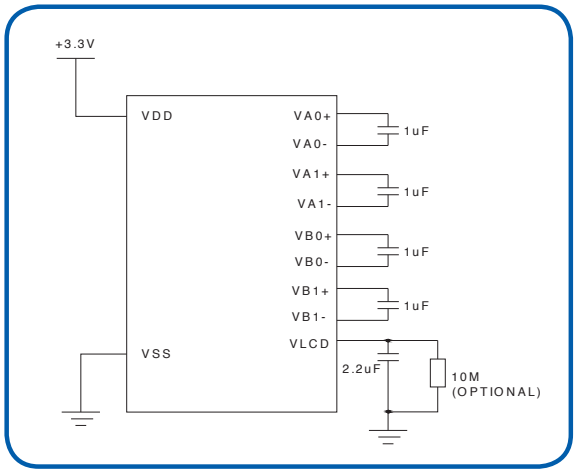
FFSTN Negative Green LED Backlight

FFSTN Negative Blue LED Backlight

Mechanical Details

Please refer to the separate mechanical drawings for each display

Power Supply



Pin Description

Pin no	Symbol	Function
1	NC	No Connection
2	D15	Bi-directional bus for parallel host interface
3	D13	
4-11	D7-D0	
12	RST	External reset pin, low active. If RST not used, connect to VDD
13	CS0	Chip select pin. Chip is selected when CS0=L (CS1=H hardwired internally)
14	CD	Display/control data select "H":display data ; "L":control data
15	WR0	WR [1:0] controls the read/write operation of the host interface. See Host Interface section for details. In parallel mode, the meaning of WR[1:0] depends on which interface it is in, 6800 or 8080 mode. In serial interface modes, these two pins are not used, Connect them to VSS.
16	WR1	
17	BM0	Bus mode: The interface bus mode is determined by BM0 and {D15, D13} by the following relationship:

BMO	{D15, D13}	Mode
1	Data	6800/16-bit
0	Data	8080/16-bit

18	TST4	TST4 controls test mode and is also used to supply one of the high voltage required for MTP Program operation. Leave TST4 open during normal LCD operation.
19	VSS	Power supply, 0V. Connect VSS and VSS2 to the shared GND pin
20	VDD	Power supply, +3.3V. VDD supplies for Display Data RAM and digital logic
21	VLCD	High voltage LCD Power Supply. Connect these pins together. A bypass capacitor CL of 1uF should be connected between VLCD and VSS.
22	VA0-	LCD Bias Voltages. These are the voltage sources to provide SEG driving currents. These voltages are generated internally. Connect capacitor of 2.2uF value between i) VA0+ & VA0- ii) VA1+ & VA1+ iii) VB0+ & VB0- iv) VB1+ & VB1+
23	VA1-	
24	VA1+	
25	VA0+	
26	VB0-	
27	VB1-	
28	VB1+	
29	VB0+	
30	NC	No Connection

Maximum Absolute Limit (T=25˚C)

Item	Symbol	Standard Value	Unit
Power supply voltage for logic	V_{DD}	-0.5~+4.0	V
Driver supply voltage for LCD (V0-VDD)	V_{LCD}	-0.5~+20	V
Input voltage	V_{IN}	-0.5~V_{DD}+0.5	V
Operating temperature	Topr	-20~+70	°C
Storage temperature	Tstg	-30~+80	°C

Electrical Characteristics (DC Characteristics (VDD=2.7~3.3V,Ta=25˚C))

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Supply for digital circuit	V_{DD}	3.0	3.3	3.6	V	
Current consumption	I_{DD}	-	250	500	µA	
Charge pump output	V_{LCD}	-	15.5	-	V	
LCD data voltage	V_D			1.69	V	
Input logic LOW	V_{IL}			0.2V_{DD}	V	
Input logic HIGH	V_{IH}	0.8V_{DD}			V	
Output logic LOW	V_{OL}			0.2V_{DD}	V	
Output logic HIGH	V_{OH}	0.8V_{DD}			V	
Input leakage current	I_{IL}			1.5	µA	
Input capacitance	C_{IN}		5	10	pF	
Output capacitance	C_{OUT}		5	10	pF	
SEG output impedance	$R_{O(SEG)}$		1.35	2.5	kΩ	V_{LCD} = 17V
COM output impedance	$R_{O(COM)}$		1.35	2.5	kΩ	V_{LCD} = 17V
Average Line rate	*f*LINE	-10%	28	+10%	kHz	LC[5:4] = 10b

Backlight Specification

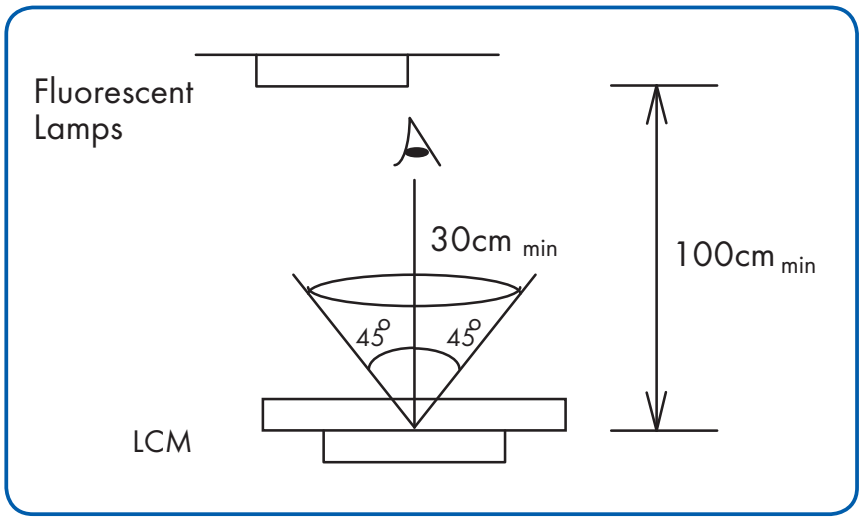
Please refer to the individual datasheets for details

Quality Specifications

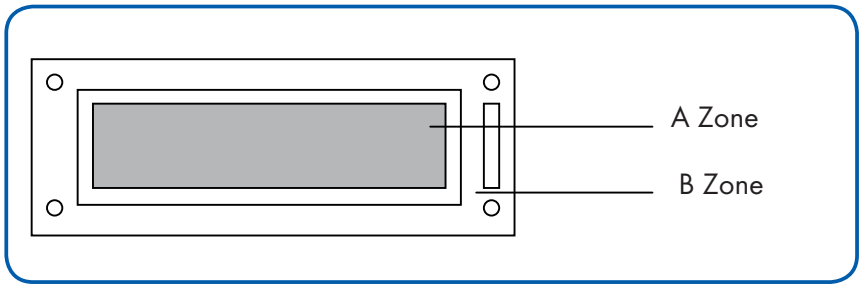
Standard of the product appearance test

Manner of appearance test: The inspection should be performed in using 20W x 2 Fluorescent lamps. Distance between LCM and fluorescent lamps should be 100cm or more. Distance between LCM and inspector eyes should be 30cm or more.

Viewing direction for inspection is 45° from vertical against LCM



Definition of zone:



A Zone: Display area (LCD)

B Zone: PCB

Specification of quality assurance

AQL inspection standard

Sampling method: MIL-STD-105E, Level II, single sampling

Defect classification

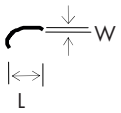
Classify	Item		Note	AQL
Major	Display State	Short or open circuit	1	0.65
		Contrast defect (dim, ghost)		
		LC leakage		
		Flickering		
		No display		
		Wrong viewing direction	2	
		Wrong Backlight	7	
	Non-Display	Flat cable or pin reverse	9	
		Wrong or missing component	10	
Minor	Display State	Background colour deviation	2	1.5
		Black spot and dust	3	
		Line defect	4	
		Scratch		
		Rainbow	5	
		Pin hole	6	
	Polarizer	Bubble and foreign material	3	
		Scratch	4	
	PCB	Scratch	4	
	Soldering	Poor connection	8	
	Wire	Poor connection	9	

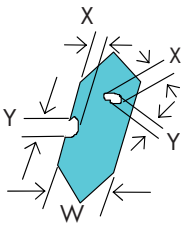
Note on defect classification

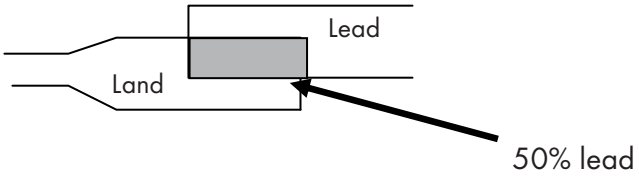
No.	Item	Criterion
1	Short or open circuit	Not allow
	LC leakage	
	Flickering	
	No display	
	Wrong viewing direction	
	Wrong Backlight	
2	Contrast defect	Refer to approval sample
	Background colour deviation	
3	Point defect, Black spot, dust (incl. Polarizer) Φ = (X+Y)/2	

Point Size	Acceptable Qty.
φ≤0.10	Disregard
0.10<φ≤ 0.20	3
0.20<φ≤ 0.25	2
0.25<φ≤ 0.30	1
φ>0.30	0

Unit： mm

<table>
<tr><th>No.</th><th>Item</th><th>Criterion</th></tr>
<tr><td>4</td><td>Line defect</td><td> 

<table>
<tr><td colspan="2">Line</td><td>Acceptable Qty.</td></tr>
<tr><td>L</td><td>W</td><td></td></tr>
<tr><td>–</td><td>0.015≥ W</td><td>Disregard</td></tr>
<tr><td>3.0≥ L</td><td>0.03≥ W</td><td rowspan="2">2</td></tr>
<tr><td>2.0≥ L</td><td>0.05≥ W</td></tr>
<tr><td>1.0≥ L</td><td>0.1 >W</td><td>1</td></tr>
<tr><td>–</td><td>0.05<W</td><td>Applied as point defect</td></tr>
</table>
Unit: mm</td></tr>
<tr><td>5</td><td>Rainbow</td><td>Not more than two colour changes across the viewing area.</td></tr>
<tr><td>6</td><td>Segment
pattern
W = Segment width
Φ = (X+Y)/2</td><td>(1) Pin hole
Φ < 0.10mm is acceptable.
 

<table>
<tr><td>Point Size</td><td>Acceptable Qty</td></tr>
<tr><td>φ≤1/4 W</td><td>Disregard</td></tr>
<tr><td>1/4W<φ≤1/2 W</td><td>1</td></tr>
<tr><td>φ> 1/2W</td><td>0</td></tr>
</table>
Unit: mm</td></tr>
<tr><td>7</td><td>Back-light</td><td>(1) The colour of backlight should correspond its specification.
(2) Not allow flickering</td></tr>
<tr><td>8</td><td>Soldering</td><td>(1) Do not allow dirt or solder on PCB.
(The size of dirt refers to point and dust defect)
(2) Over 50% of lead should be soldered on Land.
 
</td></tr>
<tr><td>9</td><td>Wire</td><td>(1) Copper wire should not be rusted
(2) Not allow crack on copper wire connection.
(3) Not allow reversing the position of the flat cable.
(4) Not allow exposed copper wire inside the flat cable.</td></tr>
<tr><td>10</td><td>PCB</td><td>(1) Not allow screw rust or damage.
(2) Not allow missing or wrong placement of component.</td></tr>
</table>

Reliability of LCM

Item	Condition	Time (hrs)	Assessment
High temp. Storage	70°C	240	No abnormalities in functions and appearance
High temp. Operating	50°C	240	
Low temp. Storage	-20°C	240	
Low temp. Operating	0°C	240	
Humidity	40°C/ 90%RH	240	
Temp. Cycle	-20°C ← 25°C → 70°C (30 min ← 5 min → 30min)	10cycles	

Recovery time should be 24 hours minimum. Moreover, functions, performance and appearance shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (20+8°C), normal humidity (below 65% RH), and in the area not exposed to direct sun light.

Precaution for using LCM

LCM is assembled and adjusted with a high degree of precision. Do not attempt to make any alteration or modification. The followings should be noted.

General Precautions:

1. LCD panel is made of glass. Avoid excessive mechanical shock or applying strong pressure onto the surface of display area.

2. The polarizer used on the display surface is easily scratched and damaged. Extreme care should be taken when handling. To clean dust or dirt off the display surface, wipe gently with cotton, or other soft material soaked with isoproply alcohol, ethyl alcohol or trichlorotriflorothane, do not use water, ketone or aromatics and never scrub hard.

3. Do not tamper in any way with the tabs on the metal frame.

4. Do not make any modification on the PCB without consulting IDS.

5. When mounting a LCM, make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.

6. Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels and also cause rainbow on the display.

7. Be careful not to touch or swallow liquid crystal that might leak from a damaged cell. Any liquid crystal adheres to skin or clothes, wash it off immediately with soap and water.

Static Electricity Precautions:

1. CMOS-LSI is used for the module circuit; therefore operators should be grounded whenever they come into contact with the module.

2. Do not touch any of the conductive parts such as the LSI pads; the copper leads on the PCB and the interface terminals with any parts of the human body.

3. Do not touch the connection terminals of the display with bare hand; it will cause disconnection or defective insulation of terminals.

4. The modules should be kept in anti-static bags or other containers resistant to static for storage.

5. Only properly grounded soldering irons should be used.

6. If an electric screwdriver is used, it should be grounded and shielded to prevent sparks.

7. The normal static prevention measures should be observed for work clothes and working benches.

8. Since dry air is inductive to static, a relative humidity of 50-60% is recommended.

Soldering Precautions:

1. Soldering should be performed only on the I/O terminals.

2. Use soldering irons with proper grounding and no leakage.

3. Soldering temperature: 280°C+10°C

4. Soldering time: 3 to 4 second.

5. Use eutectic solder with resin flux filling.

6. If flux is used, the LCD surface should be protected to avoid spattering flux.

7. Flux residue should be removed.

Operation Precautions:

1. The viewing angle can be adjusted by varying the LCD driving voltage Vo.

2. Since applied DC voltage causes electro-chemical reactions, which deteriorate the display, the applied pulse waveform should be a symmetric waveform such that no DC component remains. Be sure to use the specified operating voltage.

3. Driving voltage should be kept within specified range; excess voltage will shorten display life.

4. Response time increases with decrease in temperature.

5. Display colour may be affected at temperatures above its operational range.

Operation Precautions:

1. Keep the temperature within the specified range usage and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel-off or generate bubbles.

2. For long-term storage over 40°C is required, the relative humidity should be kept below 60%. Avoid direct sunlight.