



AND10C209A-DHB

10.4" VGA Color TFT LCD Module

Features

- High luminance (twice standard HB version without an increase in power consumption or size)
- Twin CCFL backlight
- Low reflection
- Clear 256K colors (K=1024)
- Thin and lightweight design
- Fully compatible with AND10C273-DHB (SVGA)
- VGA (640 x 480 pixels color display)
- Replaceable lamp structure
- Fast response time
- Applications: Display Terminals, Scientific Instruments, Medical Instruments, Test and Measurement Instruments, Process Control/Factory Automation Equipment, Office Automation Equipment

Mechanical Specifications

Item	Specification	Unit
Outline Dimensions	265.0 (H) x 188.8 (V) x 12 max (D)	mm
Number of Pixels	640 (H) x 480 (V)	Pixels
Active Area	211.2 (H) x 158.4 (V)	mm
Pixel Pitch	0.33 (H) x 0.33 (V)	mm
Weight (approx.)	590	gram
Backlight	CCFL, Side-light type (twin lamps)	—

Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit
Supply Voltage	V_{DD}	-0.3	7.0	V
	V_{FL}	0	2000	Vrms
FL Driving Frequency	f_{FL}	0	100	KHz
Input Signal Voltage	V_{IN}	-0.3	$V_{DD} + 0.3$	V
Operating Temperature	T_{op}	0	50	°C
Storage Temperature	T_{stg}	-20	60	°C
Humidity (Max. Wet bulb temp = 39°C)	—	10	90	%RH

Electrical Specifications (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{DD}	4.75	5.0	5.25	V
	V_{FL}	500	550	600	Vrms
FL Start Voltage (Ta = 0°C)		1500	—	—	Vrms
High Level Input Voltage	V_{IH}	3.5	—	V_{DD}	V
Low Level Input Voltage	V_{IL}	0	—	1.5	V
Current Consumption	I_{DD}	—	125	250	mA
	I_{FL}	3.0	6.0	7.0	mA rms
Power Consumption (*1)	P	—	7.2	—	W

*1: Before the efficiency loss of CCFL inverter

Optical Specifications (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit
Contrast	CR	100	—	—	—
Response	t_{on}	—	—	50	ms
	t_{off}	—	—	50	ms
Luminance	L	—	500	—	cd/m ²

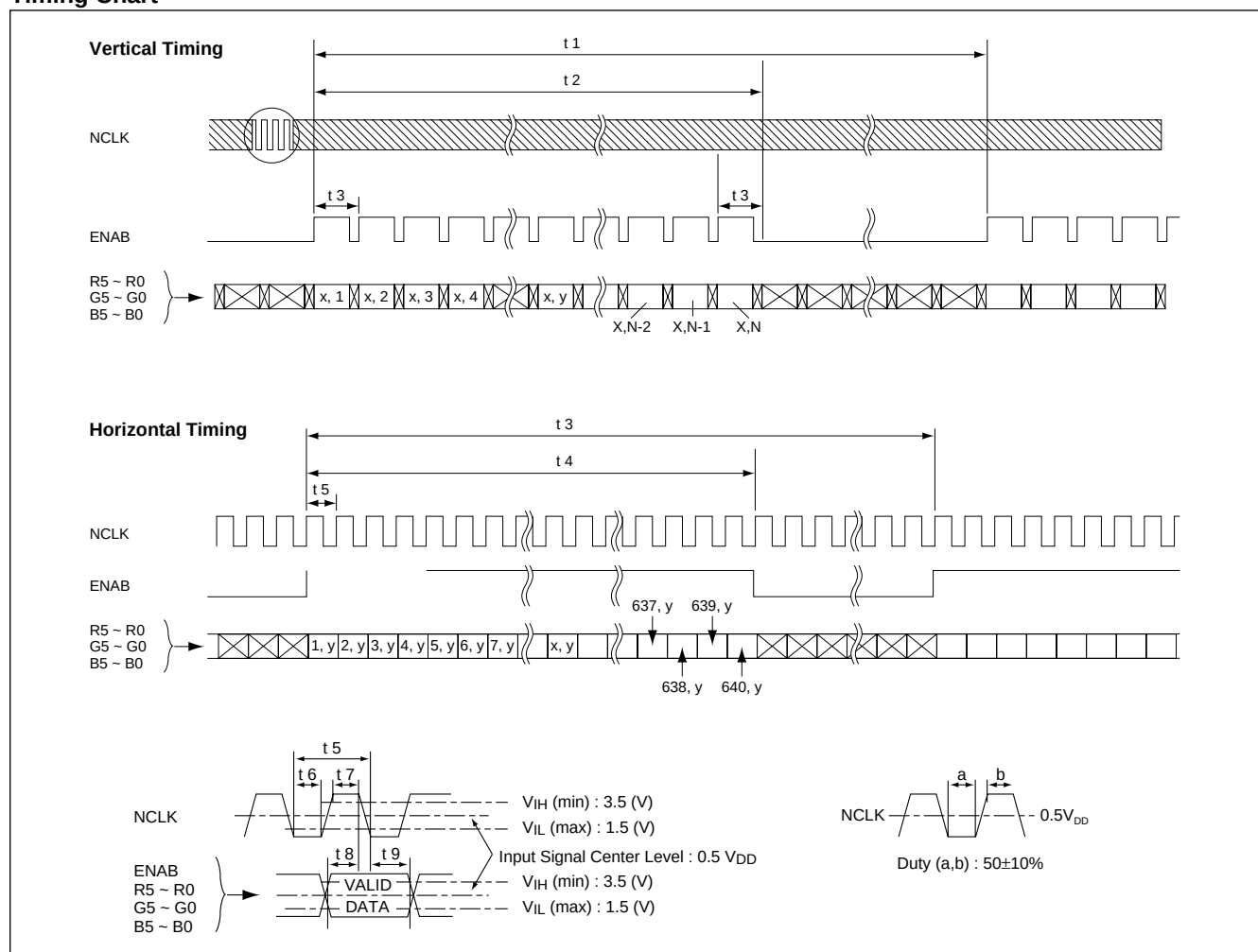


Timing Specifications

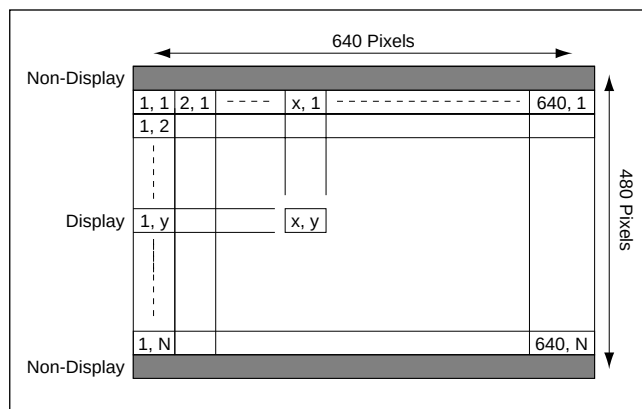
Item	Sym	Min	Typ	Max	Unit
Frame Period	t1	$(249+N/2) \times t3$ —	525 x t3 16.68	525 x t3 17.85	— ms
Vertical Display Term*	t2	300 x t3	480 x t3	480 x t3	—
One Line Scanning Time	t3	684 x t5 31.5	800 x t5 31.78	860 x t5	— μs
Horizontal Display Term	t4	640 x t5	640 x t5	640 x t5	—
Clock Period	t5	35.0	39.72	—	ns
Clock "L" Time	t6	10.0	—	—	ns
Clock "H" Time	t7	7.0	—	—	ns
Set Up Time	t8	5.0	—	—	ns
Hold Time	t9	10.0	—	—	ns

* t2 = Nx t3

Timing Chart



Note: When the vertical display period (N) is shorter than 480, the actual display area is shifted to the center. The non-display area becomes dark as follows:



- Recommended LCD Controller: CL-GD6440 (Cirrus Logic) 65548, 65550 (Chips & Technologies)
-
- Recommended Inverter: INVR1918 (Hitachi)

Connector Pin Assignment for Interface

CN2 CCFL Power Supply

(BHR-03VS-1/Japan Solderless Terminal Mfg. Co. Ltd –JST)

Terminal No.	Symbol	Function
1	VL	CCFL 1 Input (High Voltage)
2	NC ⁽¹⁾	Open
3	GL	CCFL 1 Input (GND Side)

CN3 CCFL Power Supply

(BHR-03VS-1/Japan Solderless Terminal Mfg. Co. Ltd.)

Terminal No.	Symbol	Function
1	VL	CCFL 2 Input (High Voltage)
2	NC ⁽¹⁾	Open
3	GL	CCFL 2 Input (GND Side)

Note (1): NC terminal is open. (Don't use.)

CN1 Input Signal (1)

(DF9-31P-1V/Hirose Electric Co. Ltd.)

Terminal No.	Symbol	Function
1	GND	Ground
2	NCLK	Sampling Clock
3	GND	Ground
4	R0 ⁽²⁾	Red Display Data (LSB)
5	R1 ⁽²⁾	Red Display Data
6	R2 ⁽²⁾	Red Display Data
7	GND	Ground
8	R3 ⁽²⁾	Red Display Data
9	R4 ⁽²⁾	Red Display Data
10	R5 ⁽²⁾	Red Display Data (MSB)
11	GND	Ground
12	G0 ⁽²⁾	Green Display Data (LSB)
13	G1 ⁽²⁾	Green Display Data
14	G2 ⁽²⁾	Green Display Data
15	GND	Ground
16	G3 ⁽²⁾	Green Display Data
17	G4 ⁽²⁾	Green Display Data
18	G5 ⁽²⁾	Green Display Data (MSB)
19	GND	Ground
20	ENAB	Compound Synchronization Signal
21	GND	Ground
22	B0 ⁽²⁾	Blue Display Data (LSB)
23	B1 ⁽²⁾	Blue Display Data
24	B2 ⁽²⁾	Blue Display Data
25	GND	Ground
26	G3 ⁽²⁾	Blue Display Data
27	G4 ⁽²⁾	Blue Display Data
28	G5 ⁽²⁾	Blue Display Data (MSB)
29	GND	Ground
30	V _{DD}	+5V Power Supply
31	V _{DD}	+5V Power Supply



Note (2): 512K colors are displayed by the combinations of 18 data bits.

	Display	R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0	Gray Scale Level
Basic Color	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	–
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	–
	Green	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	–
	Lt. Blue	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	–
	Red	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	–
	Purple	H	H	H	H	H	H	L	L	L	L	L	L	H	H	H	H	H	H	–
	Yellow	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	–
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	–
Gray Scale of Red	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L1
		L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L3~
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L60
	Light	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L61
		H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L62
	Red	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	Red L63
Gray Scale of Green	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L1
		L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L3~
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L60
	Light	L	L	L	L	L	L	H	H	H	H	L	H	L	L	L	L	L	L	L61
		L	L	L	L	L	L	H	H	H	H	H	L	L	L	L	L	L	L	L62
	Green	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	Green L63
Gray Scale of Blue	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L3~
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L60
	Light	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	L	H	L61
		L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	L	L62
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	Blue L63
Gray Scale of White & Black	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	H	L	L	L	L	L	H	L	L	L	L	L	H	L1
		L	L	L	L	H	L	L	L	L	L	H	L	L	L	L	L	H	L	L2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L3~
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L60
	Light	H	H	H	H	L	H	H	H	H	L	H	H	H	H	H	H	L	H	L61
		H	H	H	H	H	L	H	H	H	H	L	H	H	H	H	H	H	L	L62
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	White L63