

## AND04C380K

### 4" VGA Color p-Si TFT LCD Module

The AND04C380K is 640 x 480 Color TFT display that utilizes new poly-silicon (p-Si) technology to provide a brighter, thinner and lighter display with high-resolution. The p-Si TFT technology allows the row and column LCD drivers to be fabricated directly on the LCD glass. This eliminates the need for discrete TAB drivers. Wide viewing angle technology provides excellent images from all directions. The single tube CCFL backlight offers a very bright display, thus making it ideal for PDAs (personal digital assistants).

### Features

- p-Si construction with drivers on glass
- Wide viewing angle ( $\pm 45^\circ$  at CR> 30)
- High luminance, long life backlight (50,000 hours)
- Super high resolution (202 pixels/inch)
- Clear 256K colors (K=1024)
- Thin and lightweight design
- VGA (640 x 480 pixels color display)
- Applications: PDAs (personal digital assistants)

### Mechanical Characteristics

Item	Specification	Unit
Outline Dimensions	117.9 (H) x 72.5 (V) x 6.4 max (D)	mm
Number of Pixels	640 (H) x 480 (V)	pixels
Active Area	80.64 (H) x 60.48 (V)	mm
Pixel Pitch	0.126 (H) x 0.126 (V)	mm
Weight (approx.)	65	gram
Backlight	Single CCFL, Side-light type	—

### Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Supply Voltage	$V_{DD}$	0.0	4.5	V
	$V_{FL}$	—	1500	Vrms
FL Driving Frequency	$f_{FL}$	—	160	kHz
Input Signal Voltage	$V_{IN}$	-0.3	$V_{DD} + 0.3$	V
Operating Temperature	$T_{op}$	0	50	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-20	60	$^\circ\text{C}$
Humidity (Max. Wet bulb temp = 29 $^\circ\text{C}$ )	—	10	90	% RH

### Electrical Characteristics (Ta = 25 $^\circ\text{C}$ )

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage ( $I_{FL}=3\text{mA}$ )	$V_{DD}$	3.0	3.3	3.6	V
	$V_{FL}$	—	325	—	Vrms
FL Start Voltage (Ta = 0 $^\circ\text{C}$ )	—	750	—	—	Vrms
High Level Input Voltage	$V_{IH}$	0.8x $V_{DD}$	—	$V_{DD}$	V
Low Level Input Voltage	$V_{IL}$	0	—	0.2x $V_{DD}$	V
Current Consumption	$I_{DD}$	—	115	—	mA
	$I_{FL}$	—	2.0	3.0	mAmps
Power Consumption (*1 *2)	P	—	1.1	1.7	W

\*1: 8 color bars pattern

\*2: Except the efficiency of FL inverter

### Optical Characteristics (Ta = 25 $^\circ\text{C}$ )

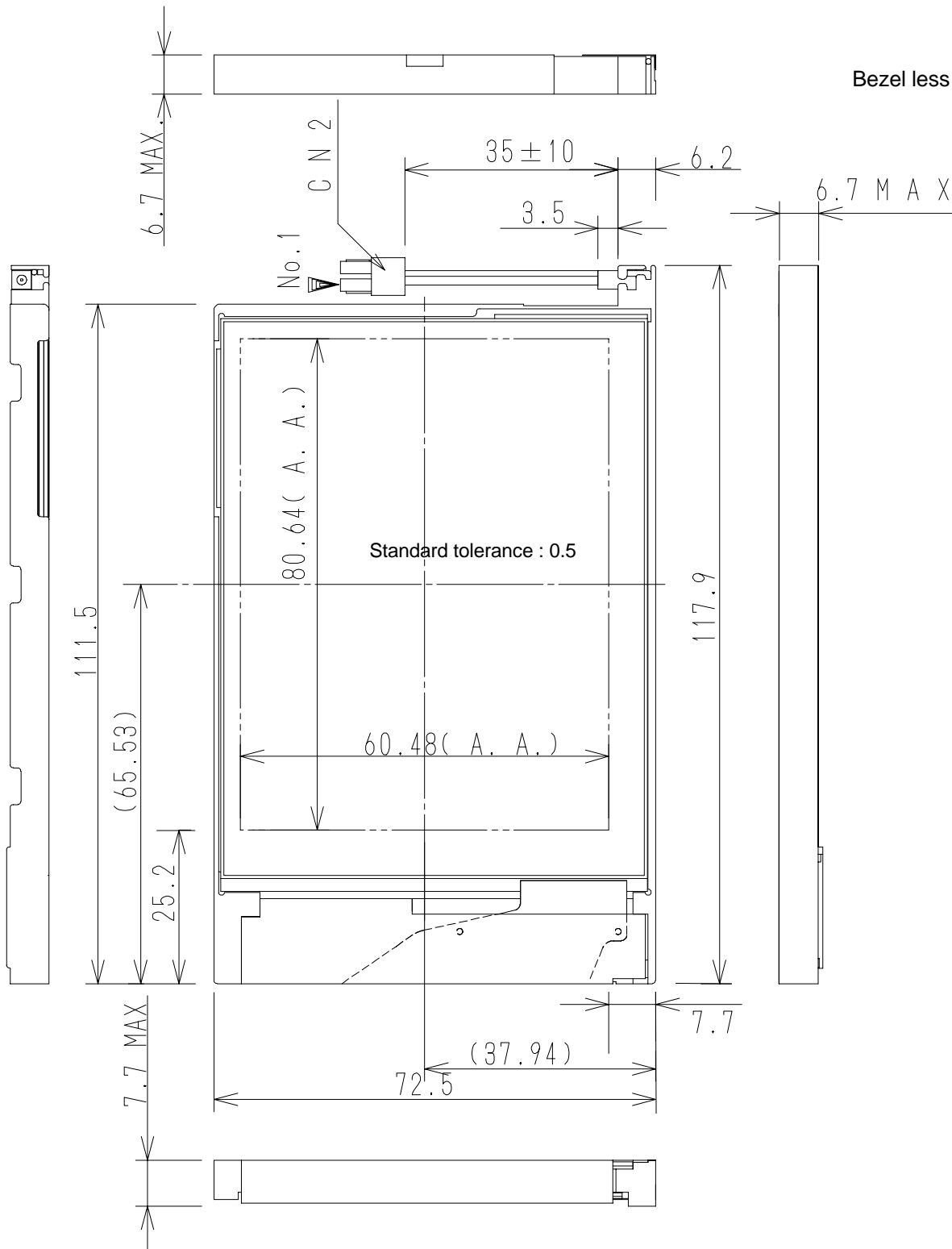
Item	Symbol	Min.	Typ.	Max.	Unit
Contrast	CR	100	250	—	—
Response	$t_{on}$	—	—	50	ms
	$t_{off}$	—	—	50	ms
Luminance ( $I_{FL}=2\text{mA}$ )	L	—	130	—	$\text{cd/m}^2$
Luminance ( $I_{FL}=3\text{mA}$ )	L	—	200	—	$\text{cd/m}^2$
Viewing Angle (CR>30)	$\phi_L / \phi_R$	40/40	45/45	—	deg
	$\phi_U / \phi_D$	45/45	50/50	—	deg



## AND04C380K

### Dimensional Outline

Unit: mm  
Standard tolerance: 0.5



**Timing Specifications (\*1\*2\*3)**

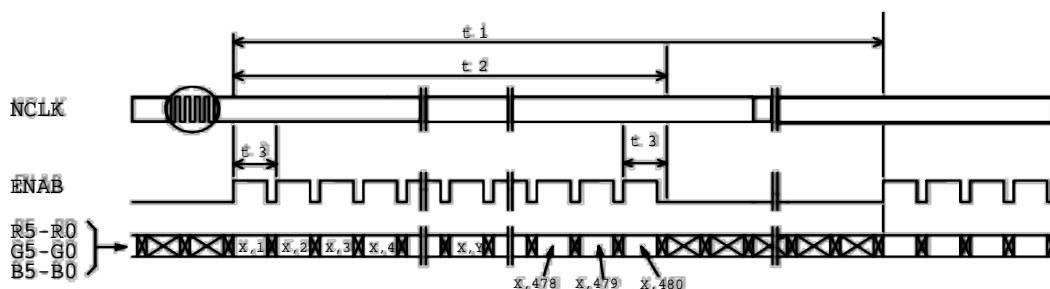
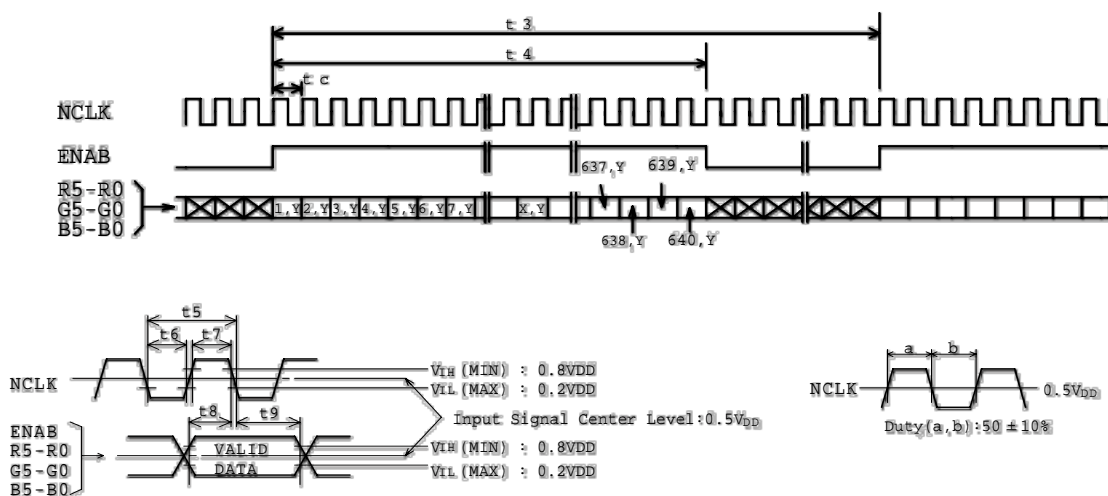
Item	Symbol	Min	Typ	Max	Unit
Frame Period (*4)	t1	489 x t3 –	525 x t3 16.68	525 x t3 17.85	– ms
Vertical Display Term	t2	480 x t3	480 x t3	480 x t3	t2 = N • t3
One Line Scanning Time (*4)	t3	784 x t5 31..5	800 x t5 31.78	860 x t5 36.5	– μs
Horizontal Display Period	t4	640 x t5	640 x t5	640 x t5	–
Clock Period	t5	35.0	39.72	46.5	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

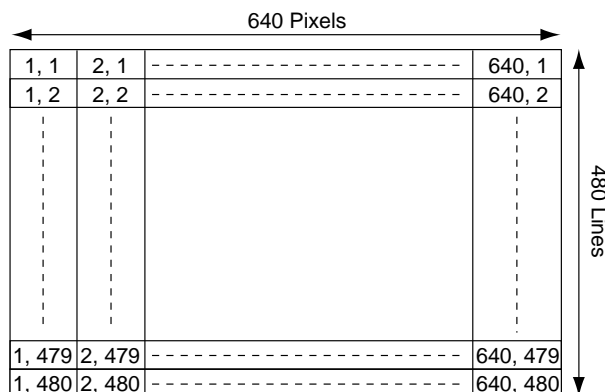
Note 1: When ENAB is fixed to “H” level or “L” level after NCLK input, the panel is displayed as black. However, it may be occurred a flicker on the display.

Note 2: When NCLK is fixed to “H” level or “L” level, the panel becomes white stage after several seconds.

Note 3: Do not change t1 and t3 values in the operation. When t1 or t3 is changed, the panel is displayed as black.

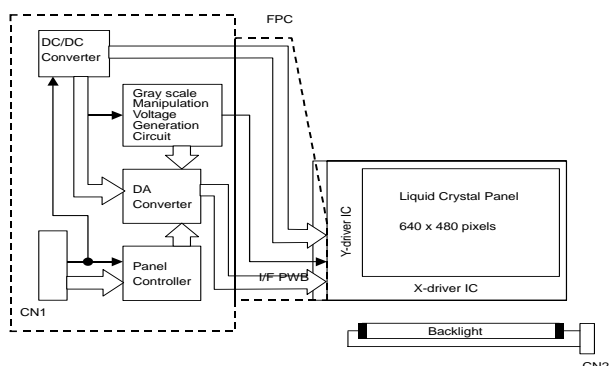
Note 4: Please adjust LCD operating signal timing and FL driving frequency, to optimize the display quality. There is a possibility that flicker is observed by the interference of LCD operating signal timing and FL driving condition (especially driving frequency.)

**Timing Chart**
**(1) Vertical Timing**

**(2) Horizontal Timing**




Recommended Inverter:

### Block Diagram



- 1) Drivers are fabricated on the LCD glass
- 2) Connectors  
 IL-FHJ-27S-HF/Japan Aviation Elec.  
 Mating Connector - FFC(0.3m Pitch)  
  
 HV-2S-C1/Japan Aviation Elec.  
 Mating Connector - HV-2P-HF

### Connector Pin Assignment for Interface

#### CN1 Input Signal (1) (IL-FHJ-27S-HF/Japan Aviation Elec.)

Terminal No.	Symbol	Function
1	VDD	+3.3V Power Supply
2	VDD	+3.3V Power Supply
3	VDD	+3.3V Power Supply
4	ENAB	Compound Synchronization Signal
5	B5 <sup>(2)</sup>	Blue Display Data (MSB)
6	B4 <sup>(2)</sup>	Blue Display Data
7	B3 <sup>(2)</sup>	Blue Display Data
8	B2 <sup>(2)</sup>	Blue Display Data
9	B1 <sup>(2)</sup>	Blue Display Data
10	B0 <sup>(2)</sup>	Blue Display Data (LSB)
11	GND	Ground
12	G5 <sup>(2)</sup>	Green Display Data (MSB)
13	G4 <sup>(2)</sup>	Green Display Data
14	G3 <sup>(2)</sup>	Green Display Data
15	G2 <sup>(2)</sup>	Green Display Data
16	G1 <sup>(2)</sup>	Green Display Data
17	G0 <sup>(2)</sup>	Green Display Data (LSB)
18	GND	Ground
19	R5 <sup>(2)</sup>	Red Display Data (MSB)
20	R4 <sup>(2)</sup>	Red Display Data
21	R3 <sup>(2)</sup>	Red Display Data
22	R2 <sup>(2)</sup>	Red Display Data
23	R1 <sup>(2)</sup>	Red Display Data
24	R0 <sup>(2)</sup>	Red Display Data (LSB)
25	GND	Ground
26	NCLK	Sampling Clock
27	GND	Ground

#### CN2 CCFL Power Source (HV-2S-C1/Japan Aviation Elec.)

Terminal No.	Symbol	Function
1	VL	CCFL Power Supply (High Voltage)
2	GL	CCFL Power Supply (Low Voltage)



Note (2): 256K 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	L	L1
		L	L	L	L	H	L	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	L	L61
		H	H	H	H	H	L	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	L	Green 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	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	L	L2
		:						:						:						L3~L60	
		:						:						:							
	Light	L	L	L	L	L	L	H	H	H	H	L	H	L	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	L	L62
	Green	L	L	L	L	L	L	H	H	H	H	H	H	L	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	L	H	L	L1
		L	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	L	L61
		L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	L	L	L62
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	H	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	L	L1
		L	L	L	L	H	L	L	L	L	H	L	L	L	L	L	L	H	L	L	L2
		:						:						:						L3~L60	
		:						:						:							
	Light	H	H	H	H	L	H	H	H	H	L	H	L	H	H	H	H	L	H	L	L61
		H	H	H	H	H	L	H	H	H	H	L	L	H	H	H	H	H	L	L	L62
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	White L63