Doc. version	1
Effective date	April./25/2005
Total pages	11
(Not include this cover page)	

Product Specification

1.8″ COLOR TFT-LCD

MODEL NAME: H018IN01V8

Note: The content of this specification is subject to change.

Record of Revision

Version	Revise Date	Page	Content
0	Mar ,18th, 2005		First draft
1	April,25th, 2005	4	To correct Interface Pin Assignments

Contents:

Appendix:

A. General Specification

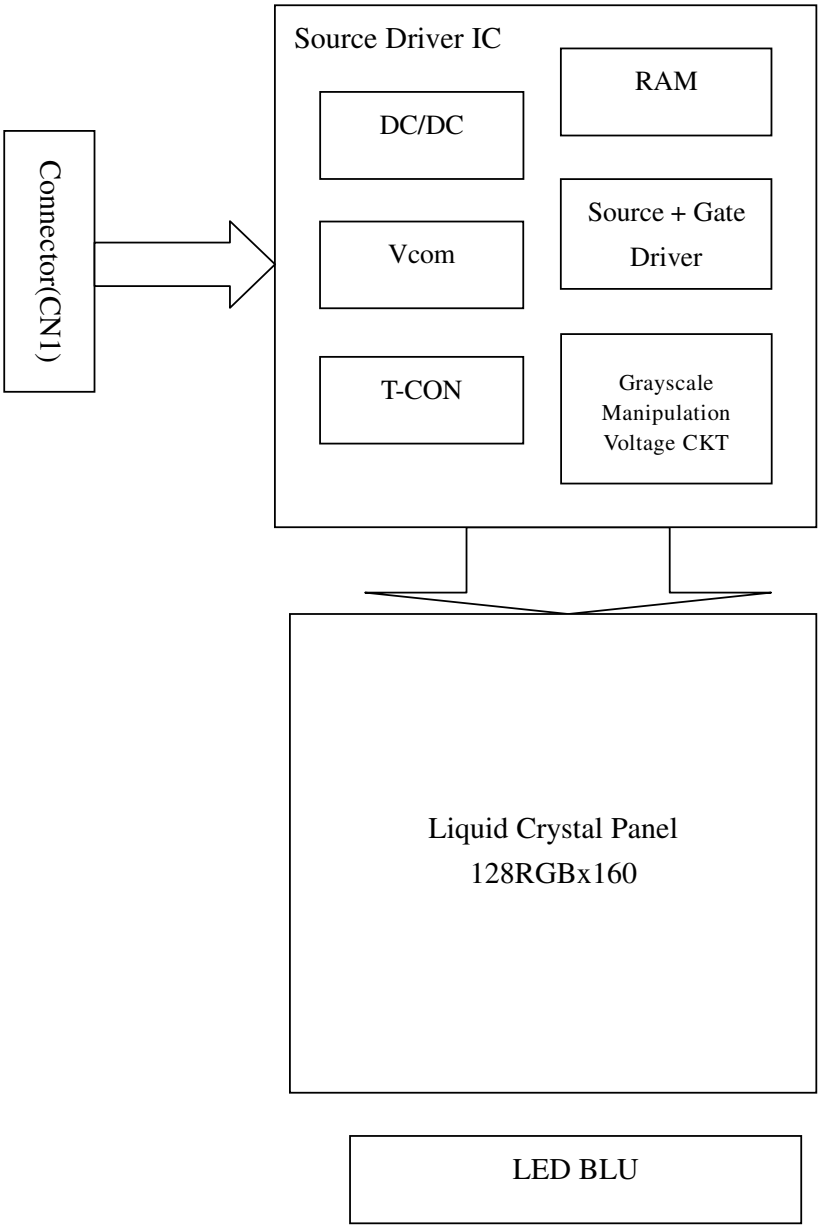
1.Physical specifications

NO.	Item	Specification	Remark
1	Display method	Active matrix TFT	
2	Display mode	Transmissive type	
3	Display resolution (dot)	128X3 (V) X 160(H)	
4	Active area (mm)	35.04(V) X 28.032(H)	
5	Screen size (inch)	1.8(Diagonal)	
6	Pixel pitch (mm)	0.219(V)×0.219(H)	
7	Color configuration	R. G. B. strip	
8	Display color	8/16 bits, 65K colors	
9	Surface treatment	Hard Coating	
10	Light technology	3 pcs LED	
11	Overall dimension (mm)	34(W)×46.7(H)×3.55(D)	
12	View Angle	12 o'clock	
13	Weight (g)	9±0.2	
14	Driver IC	NT3915	

Key features

a. Can display moving pictures up to 30 FPS, and support area scrolling and partial display
b. Can support 16 bit parallel i80 series MPU interface

2. Block diagram



B. Electrical specifications

1. Pin assignment (Pin1- 40):

No	Pin name	I/O	Description	Remark
1	LED1+	I	LED1 backlight power supply : Anode	
2	LED2+	I	LED2 backlight power supply : Anode	
3	LED3+	I	LED3 backlight power supply : Anode	
4	LED-	I	LED backlight power supply : Cathode	
5	IM0	I	MPU interface mode	
6	IM1	I	MPU interface mode	
7	IM2	I	MPU interface mode	
8	/Reset	I	System reset	
9	D_{15}	I/O	Data bus pin	
10	D_{14}	I/O	Data bus pin	
11	D_{13}	I/O	Data bus pin	
12	D_{12}	I/O	Data bus pin	
13	D_{11}	I/O	Data bus pin	
14	D_{10}	I/O	Data bus pin	
15	D_9	I/O	Data bus pin	
16	D_8	I/O	Data bus pin	
17	D_7	I/O	Data bus pin	
18	D_6	I/O	Data bus pin	
19	D_5	I/O	Data bus pin	
20	D_4	I/O	Data bus pin	
21	D_3	I/O	Data bus pin	
22	D_2	I/O	Data bus pin	
23	D_1	I/O	Data bus pin	
24	D_0	I/O	Data bus pin	
25	/RD (R/W)	I	read	
26	/WR (E)	I	write	
27	RS	I	Register select pin. L= index/status H=control	
28	/CS	I	Chip select	
29	NC	-	No connection	
30	NC	-	No connection	
31	V_{cc}	I	Logic power(V_{DD3})	
32	V_{cc}	I	Logic power(V_{DD3})	
33	V_{ci}	I	DC/DC convert power	
34	V_{ci}	I	DC/DC convert power	
35	GND	I	Analog Ground	
36	GND	I	Analog Ground	
37	GND	I	Analog Ground	
38	GND	I	Logic Ground	
39	GND	I	Logic Ground	
40	GND	I	Logic Ground	

2. Description of function

Selects the MPU interface mode :

IM2	IM1	IM0	MPU interface mode	DB Pin assign
Vss	Vss	Vss	68 system 16-bit bus interface	DB15-0
Vss	Vss	VDD	68 system 8-bit bus interface	DB15-8,
Vss	VDD	Vss	80 system 16-bit bus interface	DB15-0
Vss	VDD	VDD	80 system 8-bit bus interface	DB15-8,
VDD	*	*	None selecting	-

3. Absolute maximum ratings (V_{SS}=0V) (Note 1)

Item	Symbol	Condition	Min.	Max.	Unit	Remark
Input power supply	V_{cc}		-0.3	5.0	V	
Supply voltage for step-up circuit	V_{ci}		-0.3	5.0	V	
LCD supply voltage range	|VGH-VGL|		-	33	V	
Logic input voltage range	V_i		-0.3	V_{cc}+0.5	V	Note 2
Operating temperature	Topa		-20	70	℃	
Storage temperature	Tstg		-30	80	℃	

Note 1: If the module exceeds the absolute maximum ratings, it may be damaged permanently. Also, if the module operated with the absolute maximum ratings for a long time, its reliability may drop.

Note 2: DN(N=0 ~15), $\overline{CS}$, $\overline{RS}$, $\overline{WR}$, $\overline{RD}$, $\overline{RESET}$

4. Electrical characteristics

a. Typical operating conditions

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Input power supply		V_{CC}	2.5	2.8	3.3	V	Note 1
		Vci	2.5	2.8	3.3	V	
Input Signal Voltage	H Level	V_{IH}	0.7 x V_{CC}	-	V_{CC}	V	Note 2
	L Level	V_{IL}	0	-	0.3 x V_{CC}	V	
Output signal voltage	H Level	V_{OH}	V_{CC} - 0.5	-	V_{CC}	V	Note 3
	L Level	V_{OL}	0	-	0.5	V	

Note 1: The operations are guaranteed under the recommended operating conditions only. These operations are not guaranteed if a quick voltage change occurs during operation. To prevent noise, a bypass capacitor must be inserted into the line close to power pin.

Note 2: $\overline{CS}$, $\overline{RS}$, D0 to D15, $\overline{WR}$, $\overline{RD}$, $\overline{RESET}$,

Note 3: D0~D15

(1) b. Power consumption (Note 1)

Mode	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Stand-by	P_S	VDD= Vci=2.8V	-	-	0.02	mW	Note 2
Partial display	P_P			-	3	mW	Note 3
Still	P_g		-	-	8	mW	Note 4

Note 1: No backlight is driven

Note 2: Display off

Note 3: 20 black display lines

Note 4: Full screen with 65K colors (Line inversion)

c. Backlight driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Units	Remark
LED voltage	V_L	-	3.2	-	V	
LED current	I_L	-	20	-	mA	
Power consumption	W_L	-	150	-	mW	Note 1
LED life time	L_L	5000	10000	-	hr	Note 2

Note 1: T= 25℃, I_L =20mA, with serial LED circuit

Note 2: Brightness (I_L=20mA) to be decreased to 50% of the initial value.

D. Command & AC timing:

Detail technical information of the “Command/Data” & “AC Timing“ can be available With Driver IC specification –NovateK NT3915.

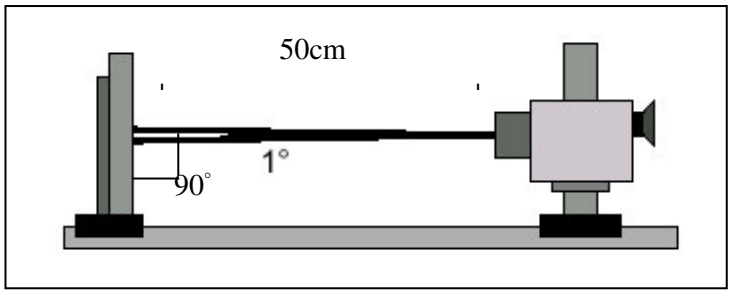
C. Optical specification (Note 1,Note 2, Note 3)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time	Rise	Tr	θ =0°	-	10	30	ms	Note 4, 5
	Fall	Tf		-	30	40	ms	
Contrast ratio		CR	At optimized Viewing angle	150	200	-		Note 5, 6
Viewing angle	Top		CR≧5	40	60	-	deg.	Note 5, 7
	Bottom			10	20	-		
	Left			30	45	-		
	Right			30	45	-		
Brightness		Y_L	θ =0° Display : White	130	180	-	cd/m^2	Note 3
Luminance Uniformity		Y_L		70	80	-	%	Note 8
Display Color		Rx	θ =0°	0.53	0.57	0.61		
		Ry		0.30	0.34	0.38		
		Gx		0.29	0.33	0.37		
		Gy		0.48	0.52	0.56		
		Bx		0.11	0.14	0.18		
		By		0.11	0.14	0.18		
		Wx		0.28	0.32	0.36		
		Wy		0.29	0.33	0.37		

Note 1: Ambient temperature =25℃±2℃.

Note 2: To be measured in the dark room.

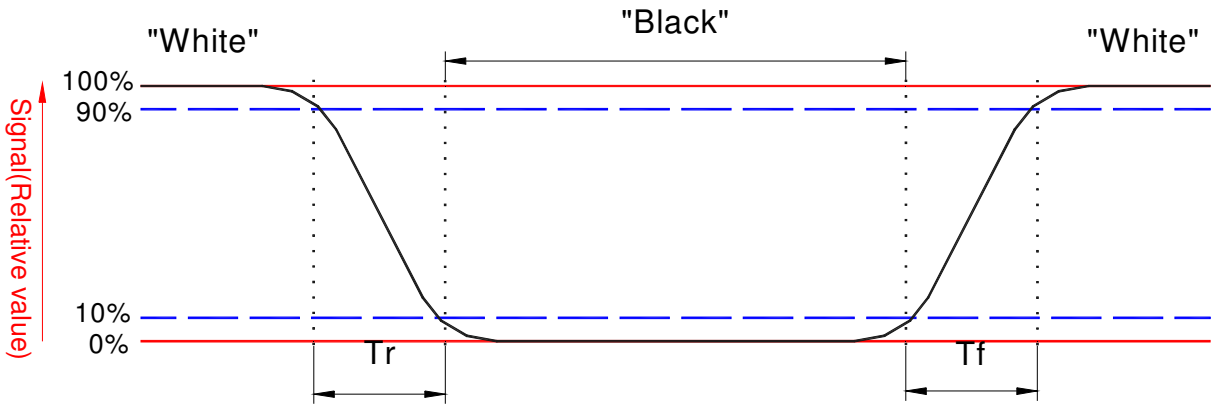
Note 3: To be measured at the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-7, after 10 minutes operation (module).



Note 4: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively.

The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below:



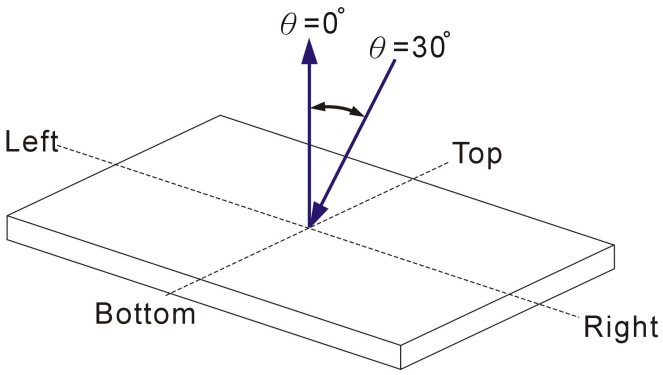
Note 5. White Vi=0.9V
Black Vi=4.5V

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

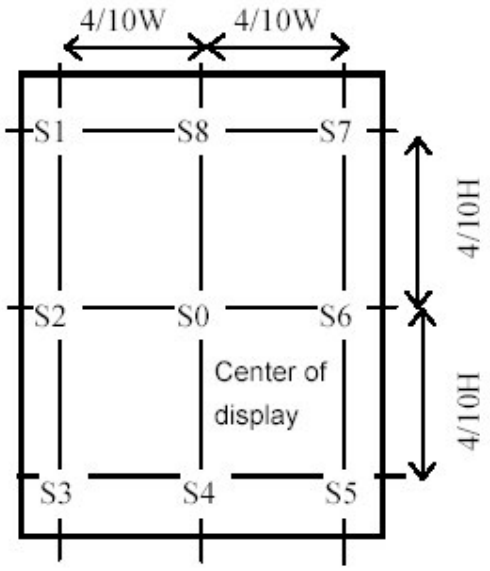
Note 6. Definition of contrast ratio:
Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at “White” state}}{\text{Photo detector output when LCD is at “Black” state}}$$

Note 7. Definition of viewing angle:
Refer to the figure as below.



Note 8. Definition of Luminance Uniformity:



$$\text{Luminance uniformity} = \frac{\text{Minimum value from S0 to S8}}{\text{Maximum value from S0 to S8}} \times 100(\%)$$

D. Reliability test items:

No.	Test items	Conditions	Remark
1	High temperature storage	Ta= 80℃ 240H	
2	Low temperature storage	Ta= -30℃ 240H	
3	High temperature operation	Ta= 70℃ 240H	
4	Low temperature operation	Ta= -20℃ 240H	
5	High temperature and high humidity	Ta= 60℃. 90% RH 240H	Operation
6	Heat shock	-30℃(1H)~80℃(1H) /50 cycles 2H/cycle	Non-operation
7	Electrostatic discharge	±200V,200pF(0Ω), once for each terminal	Non-operation
8	Electrostatic Discharge test	150pf 330Ω±8KV 5 time Air discharge 150pf 330Ω±4KV 5 time Contact discharge	Non-operation
9	Shock Test (package state)	Height: 80cm 1 corner, 3 edges, 6 surfaces	Each direction 1 time

Note: Ta: Ambient temperature.

Failure Judgment Criterion:

After finish the above-mentioned RA , leave the samples under room temperature for 2H and conduct the failure check under 25℃ 40 RH environments.

1. No abnormality nor significant deterioration should be found with display quality and appearance. (Discoloration of the polarizer can be exempted)
2. The contrast ratio and Brightness should be more than 50% of the initial value.
3. The functions should be normal.