

SPECIFICATION
 FOR
 LCD MODULE

REV
 A

Customer :

Product Model: RXK9632A F

Designed by	Checked by	Approved by

Final Approval by Customer

☐ OK

☐ NG, Problem survey:

Approved By

CONTENTS

		<u>Page No.</u>
1.	GENERAL DESCRIPTION	4
2.	MECHANICAL SPECIFICATIONS	4
3.	BLOCK DIAGRAM	6
4.	INTERFACE SIGNALS	6
5.	ABSOLUTE MAXIMUM RATINGS	7
6.	ELECTRICAL SPECIFICATIONS	8
7.	Instruction Set	10
8.	Optical Characteristics	12
9.	Design and Handling Precaution	13

Rev.	Descriptions	Release Date
0.1	Preliminary New release	2011-4-26

1. General Description

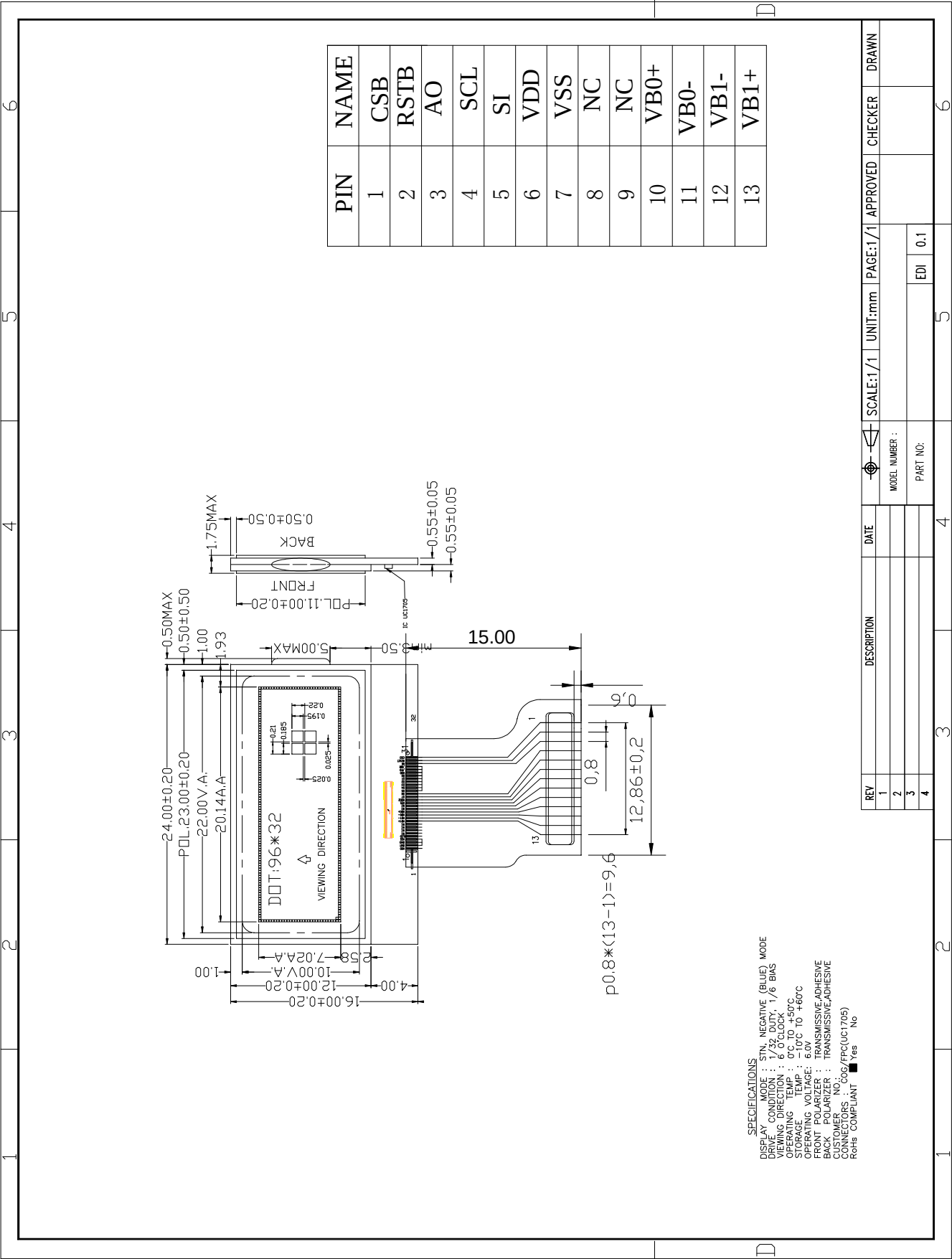
- Passive matrix bistable cholesteric display, Positive, Transflective FSTN LCD graphic module.
- Color: Display Data="1" : BLACK
 Display Data="0" : White
- Display resolution: 96*32 dots.
- Viewing angle: 6:00.
- IC: "UC"1705" 96*32 Dot Matrix LCD Driver.
- Driving scheme: Special LCD driving scheme.
- Logic voltage: 3V.
- Interface: 4SPI interface.
- FPC connection.

2. Mechanical Specifications

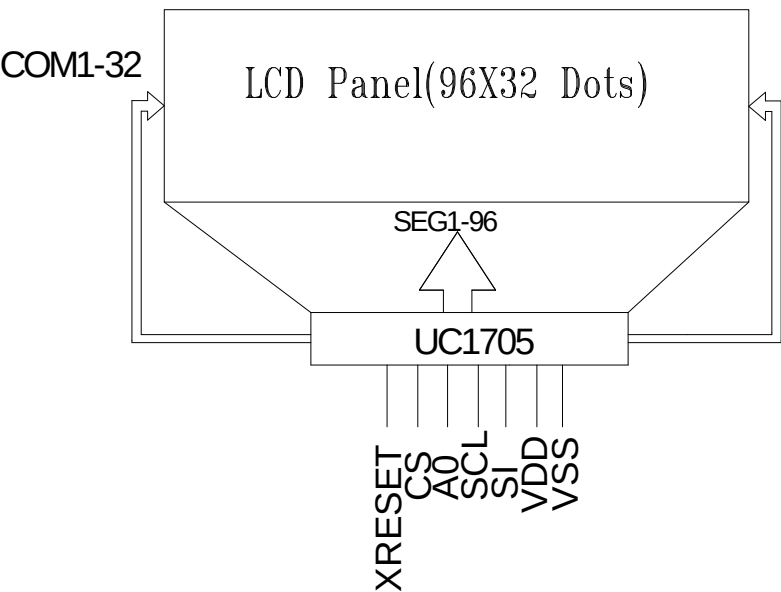
The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1

Parameter	Specifications	Unit
Outline dimensions	24.0(W) x16.0(H) x 1.75 (D)	mm
Viewing area	22.0(W) x10.0(H)	mm
Active area	20.14(W) x 7.02(H)	mm
Display format	96(Horizontal) x32(Vertical)	dots
Dot size	0.185*0.195	mm
Dot spacing	0.025*0.025	mm
Dot pitch for characters	0.21*0.22	mm
Weight	TBD	gram



3. Block Diagram



4. Interface Signals

Table 2

Pin No.	Symbol	Function
1	CS	Chip select input pin L: Chip enable
2	RES	System Reset Pin.
3	A0	Address BUS L: control data H: display data
4	SCL	Serial Pixel Signal clock input.
5	SI	Serial for write and read data input/output .
6	VDD	Power Supply.
7	VSS	Ground.
8	NC	NO connect.
9	NC	NO connect.
10	VB0+	Connect capacitor between VB0+ and VB0-.
11	VB0-	
12	VB1-	Connect capacitor between VB1- and VB1+
13	VB1+	

5. Absolute Maximum Ratings

5.1 Electrical Maximum Ratings-For IC Only

Table 3

Parameter	Symbol	Conditions	Application pins	Min.	Max.	Unit
Power Supply voltage (Logic)	VDD	TA = +25°C, Referenced to VSS (0V)	VDD	-0.3	+3.6	V
Input voltage	Vin		D7-0, CS, RES, A0, RD, WR	-0.3	VDD +0.3	V

Note1: TA = +25°C.

Note2: The maximum applicable voltage on any pin with respect to VSS (0V).

Note3: The modules may be destroyed if they are used beyond the absolute maximum ratings.

5.2 Environmental Condition

Table 4

Item	Operating temperature (Topr)		Storage temperature (Tstg) (Note 1)		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	-20°C	+70°C	-30°C	+80°C	Dry
Humidity (Note 1)	90% max. RH for Ta ≤ 40°C < 50% RH for 40°C < Ta ≤ Maximum operating temperature				No condensation
Vibration (IEC 68-2-6) cells must be mounted on a suitable connector	Frequency: 10 ~ 55 Hz Amplitude: 0.75 mm Duration: 20 cycles in each direction.				3 directions
Shock (IEC 68-2-27) Half-sine pulse shape	Pulse duration: 11 ms Peak acceleration: $981 \text{ m/s}^2 = 100g$ Number of shocks: 3 shocks in 3 mutually perpendicular axes.				3 directions

Note 1: Product cannot sustain at extreme storage conditions for long time.

6. Electrical Specifications

6.1 Typical Electrical Characteristics

Table 5

$V_{SS}=0V$, $V_{DD}=3.3V$, $T_{OP}=25\text{ }^{\circ}C$

Items	Symbol	Min.	Typ.	Max.	Unit	Condition Pin
Operating Voltage	V_{DD1}	1.65	3.0	3.6	V	VDD
	V_{DD2}	2.4	3.0	3.6	V	VDD
LCD Operating Voltage	V_{OP}	-	6.5	-	V	VO
Input High Voltage	V_{IH1}	0.8 V_{DD}	-	V_{DD}	V	RS,R/W,E,DB0~DB7
Input Low Voltage	V_{IL1}	V_{SS}	-	0.4	V	
Output High Voltage	V_{OH1}	0.7 V_{DD}	-	V_{DD}	V	DB0~DB7($V_{OH}=-0.1mA$)
Output Low Voltage	V_{OL1}	V_{SS}	-	0.2	V	DB0~DB7($V_{OH}=0.1mA$)
Operating Current	I_{DD}	-	-	0.05	mA	VDD,VSS

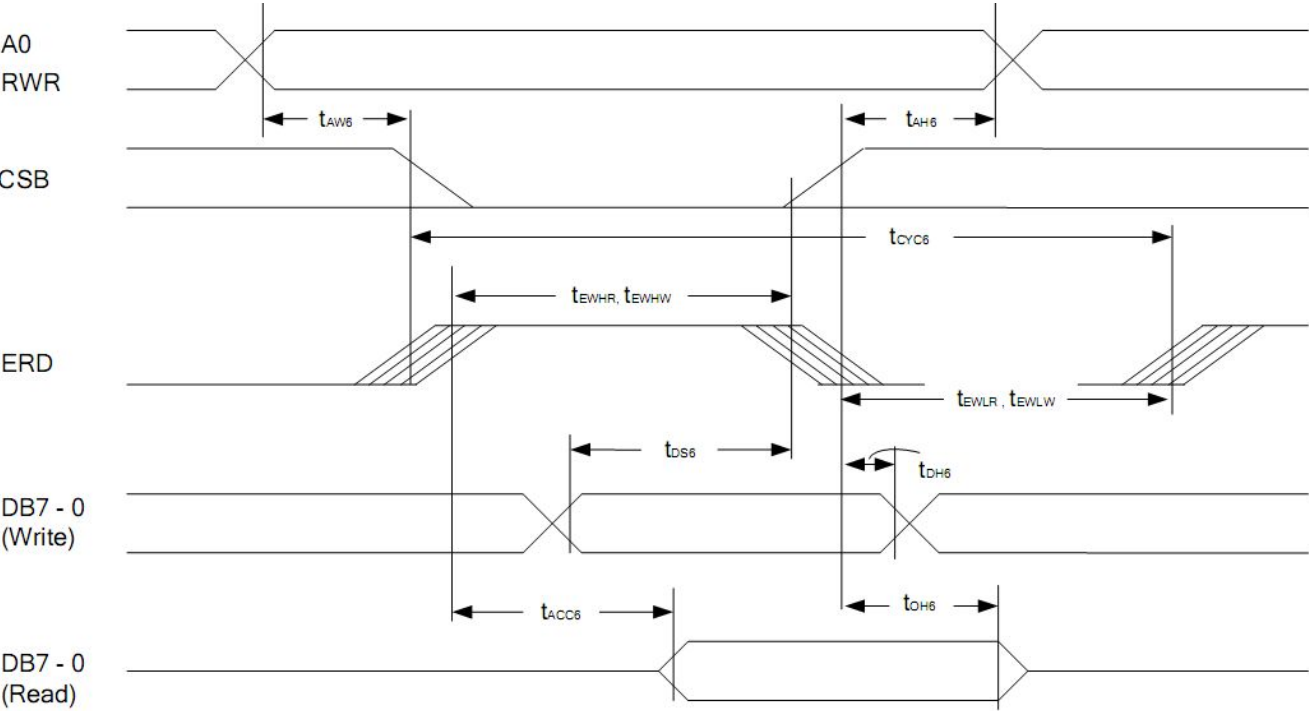
Note 1: There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.

6.2 Timing Specifications

Table 6

(VDD1 = 3.3V to 3.6V, T_A = -20 to 75°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t _{AH8}		0	-	ns
Address setup time		t _{AW8}		0	-	ns
System cycle time	A0	t _{CYC8}		240	-	ns
Control L pulse width (RWR)	RWR	t _{CCLW}		80	-	ns
Control L pulse width (ERD)	ERD	t _{CCLR}		80	-	ns
Control H pulse width (RWR)	RWR	t _{CCHW}		80	-	ns
Control H pulse width (ERD)	ERD	t _{CCHR}		80	-	ns
Data setup time	DB7 - 0	t _{DS8}		30	-	ns
Address hold time		t _{DH8}		10	-	ns
ERD access time		t _{ACC8}	C _L = 100pF	-	70	ns
Output disable time		t _{OH8}		5.0	50	ns



7. Instruction Set

Table 7

Command	Command Code											Function
	A0	ERD	RWR	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	
1). Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0	LCD display ON/OFF 0: OFF, 1: ON
2). Display start line set	0	1	0	0	1	Display start address					1	Sets the display RAM display start line address
3). Page address set	0	1	0	1	0	1	1	Page address				Sets the display RAM page address
4). Column address set upper bit	0	1	0	0	0	0	1	Most significant column address				Sets the most significant 4 bits of the display RAM column address.
Column address set lower bit	0	1	0	0	0	0	0	Least significant column address				Set the least significant 4 bits of the display RAM column address.
5). Status read	0	0	1	Status				0	0	0	0	Reads the status data
6). Display data write	1	1	0	Write data								Writes to the display RAM
7). Display data read	1	0	1	Read data								Reads from the display RAM
8). ADC select	0	1	0	1	0	1	0	0	0	0	0	Sets the display RAM address SEG output correspondence 0: normal, 1:reverse
9). Display normal/reverse	0	1	0	1	0	1	0	0	1	1	0	Sets the LCD display normal/ reverse 0: normal, 1:reverse
10). Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0	Display all points 0: normal display 1: all points ON
11). LCD bias set	0	1	0	1	0	1	0	0	0	1	0	Sets the LCD driver voltage bias ratio SPLC502C.....0:1/9, 1:1/7
12). Read/modify/write	0	1	0	1	1	1	0	0	0	0	0	Column address increment At write: +1 At read: 0
13). End	0	1	0	1	1	1	0	1	1	1	0	Clear read/modify/write
14). Reset	0	1	0	1	1	1	0	0	0	1	0	Internal reset
15). Common output mode select	0	1	0	1	1	0	0	0	*	*	*	Select COM output scan direction 0: normal direction, 1: reverse direction
16). Power control set	0	1	0	0	0	1	0	1	Operating mode			Select internal power supply operating mode
17). VH voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio			Select internal resistor ratio (Rb/Ra) mode
18). Electronic volume mode set	0	1	0	1	0	0	0	0	0	0	1	Set the VH output voltage electronic volume register
Electronic volume register set	0	1	0	*	*	Electronic volume value						

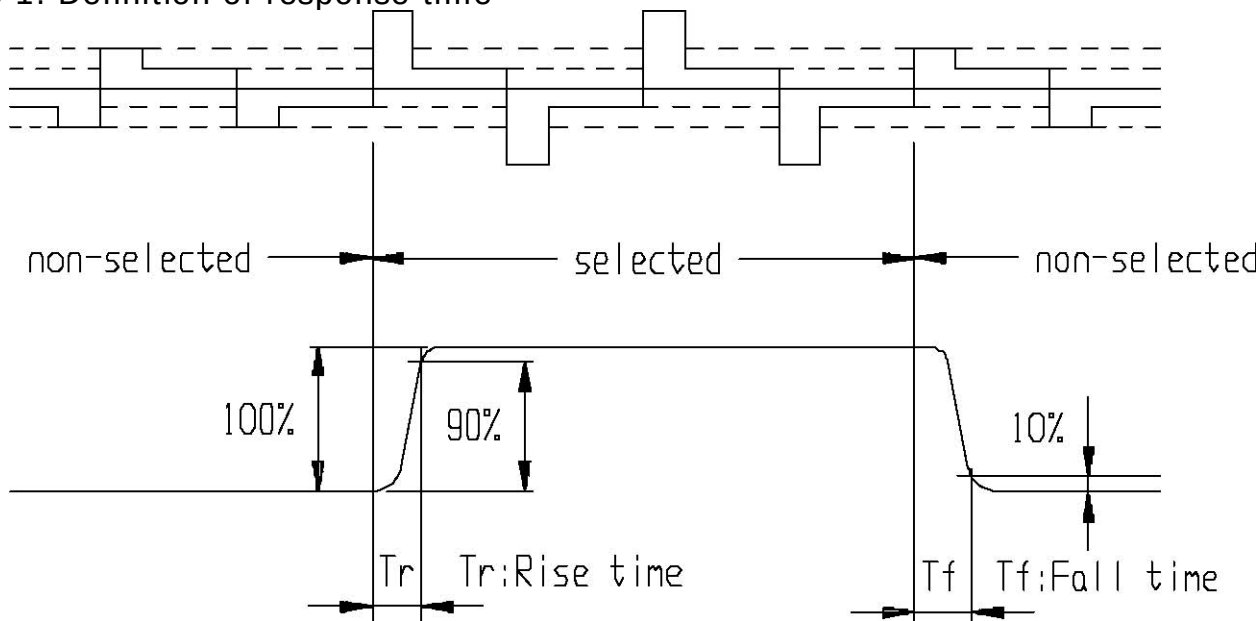
Command	Command Code											Function
	A0	ERD	RWR	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	
				*	*	*	*	*	*	*	Mode	
19). Power save												Display OFF and display all points ON compound command
20). NOP	0	1	0	1	1	1	0	0	0	1	1	Command for non-operation
21). Test	0	1	0	1	1	1	1	*	*	*	*	Command for IC test. Do not use this command
22). Oscillator Frequency selection	0	1	0	1	1	1	0	0	1	0	0	20KHz/33KHz (Default) 16.4KHz/ 27.06KHz
23). Display configuration	0	1	0	1	0	1	0	1	0	V	DO	V = 0, the horizontal addressing is selected. V = 1, the vertical addressing is selected. DO=0 LSB on top, DO=1 MSB on top.
24). Partial Display mode Set	0	1	0	1	0	0	0	0	0	1	0	Enter/Release the partial display mode
25). Partial Display Duty Set	0	1	0	0	0	1	1	0			Duty Ratio	Sets the LCD duty ratio for partial display mode
26). Partial Display Bias Set	0	1	0	0	0	1	1	1			Bias Ratio	Sets the LCD bias ratio for partial display mode
27). Partial Start Line Set	0	1	0	1	1	0	1	0	0	1	1	Enter Partial Start Line Set
Partial Start Line Set	0	1	0	*	*						Partial Start Line	Sets the LCD Number of partial display start line

8. Optical Characteristics

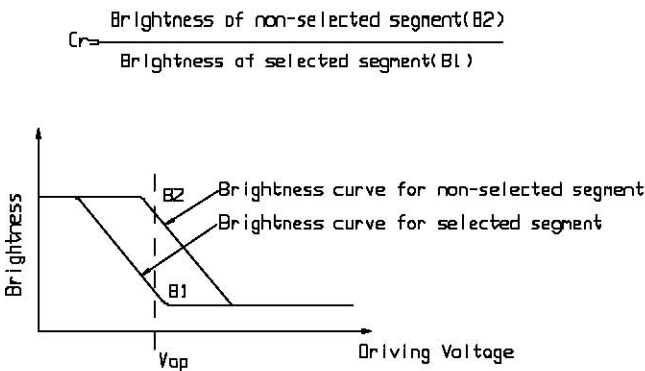
Table8

Item	Symbol	Condition	Min	Typ	Max	Unit	Remarks	Note
Response Time	Tr	-	-	-	-	ms	-	1
	Tf	-	-	-	-	ms	-	1
Contrast Ratio	Cr	-	-	-	-	-	-	2
Viewing Angle Range			-	-	-	deg	∅ = 90	3
	q	Cr ≥ 2	-	-	-	deg	∅ = 270	3
			-	-	-	deg	∅ = 0	3
			-	-	-	deg	∅ = 180	3

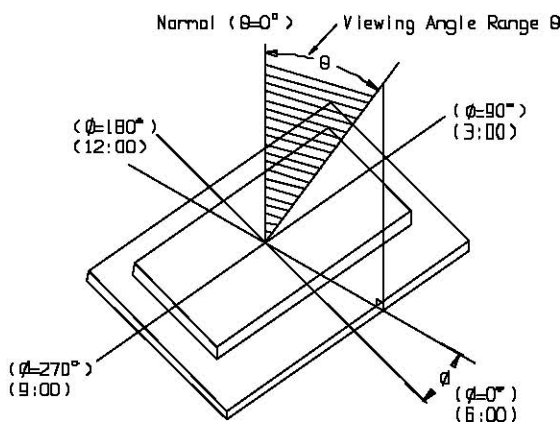
Note 1. Definition of response time



Note 2. Definition of Contrast Ratio ‘Cr’



Note 3. Definition of Viewing Angle Range



9. Design and Handling Precaution

1. The LCD panel is made by glass. Any mechanical shock (eg. Dropping form high place) will damage the LCD module.
2. Do not add excessive force on the surface of the display, which may cause the Display color change abnormally.
3. The polarizer on the LCD is easily get scratched. If possible, do not remove the LCD protective film until the last step of installation.
4. Never attempt to disassemble or rework the LCD module.
5. Only Clean the LCD with Isopropyl Alcohol or Ethyl Alcohol. Other solvent (eg. water) may damage the LCD.
6. When mounting the LCD module, make sure that it is free from twisting, warping and distortion.
7. Ensure to provide enough space (with cushion) between base and LCD panel to prevent external force adding on it, or it may cause damage to the LCD or degrade the display result.
8. Only hold the LCD module by its side. Never hold LCD module by add force on the heat seal or TAB.
9. Never add force to component of the LCD module. It may cause invisible damage or degrade of the reliability.
10. LCD module could be easily damaged by static electricity. Be careful to maintain an optimum anti-static work environment to protect the LCD module.
11. When peeling off the protective film from LCD, static charge may cause abnormal display pattern. It is normal and will resume to normal in a short while.
12. Take care and prevent get hurt by the LCD panel sharp edge.
13. Never operate the LCD module exceed the absolute maximum ratings.
14. Keep the signal line as short as possible to prevent noisy signal applying to LCD module.
15. Never apply signal to the LCD module exceed the absolute maximum ratings.
16. IC chip (eg. TAB or COG) is sensitive to the light. Strong lighting environment could possibly cause malfunction. Light sealing structure casing is recommended.
17. LCD module reliability may be reduced by reduced by temperature shock.
18. When storing the LCD module, avoid exposure to the direct sunlight, high humidity, high temperature or low temperature. They may damage or degrade the LCD module.