General Description

The G3245H has three models: Reflective type G3245H-FR, Transflective type G3245H-FH and transflective with EL Back Light type G3245H-FE.

The ultra-slim design and the low power consumption levels make these ideal for portable and battery powered applications as well as general 19" rack application. Due to its small vertical size, the fast -fluid liquid crystal and I.T.O. electrodes multiplex smear is reduced or eliminated even with the 1:240 multiplex drive.

Features

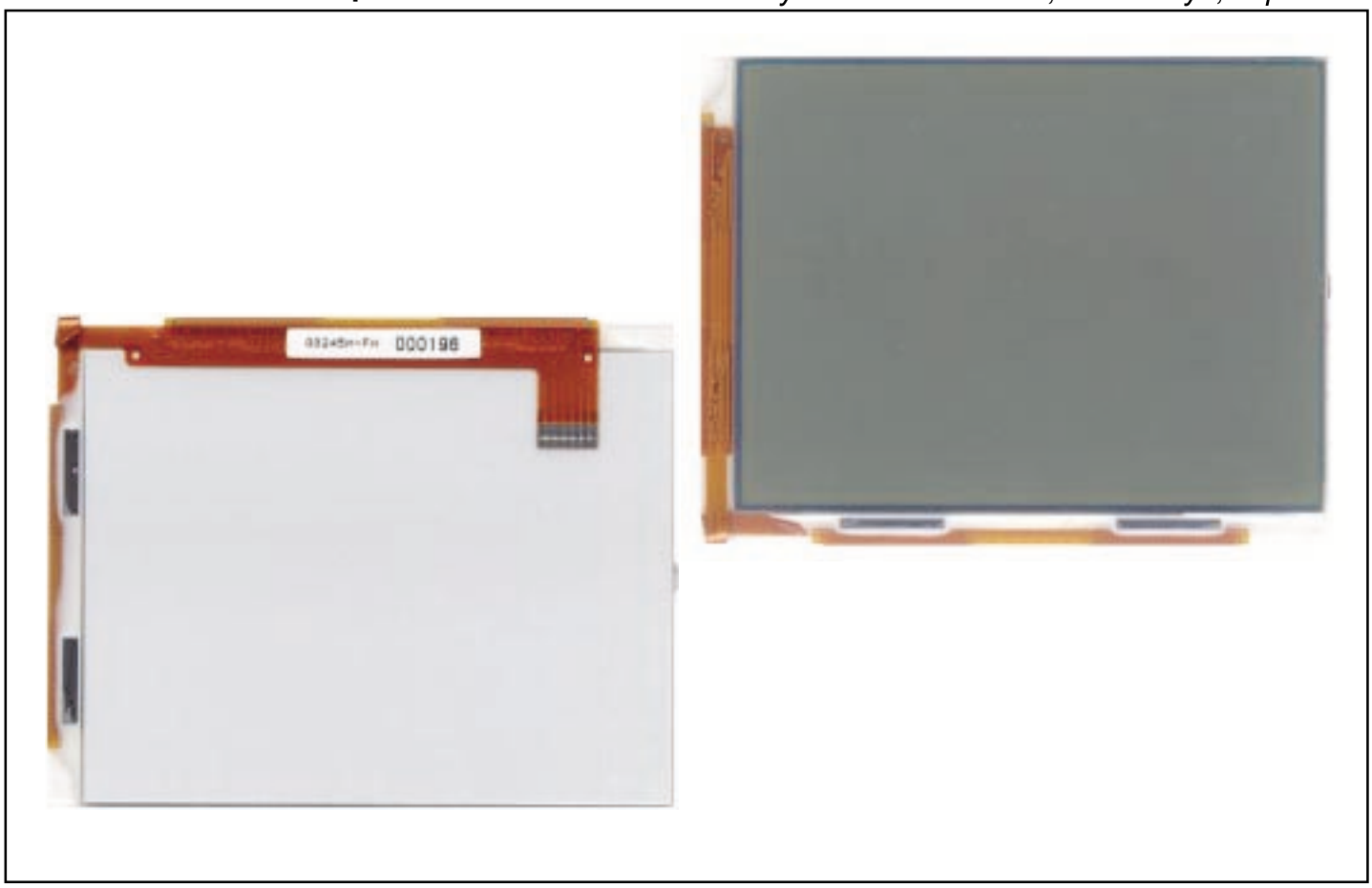
- High contrast image
- Fast response time
- Low power consumption

Applications

- Portable Instruments
- PDA
- Industrial Controls
- Lan/Cable Testers
- Handy Terminals

G3245H-FH B/W Graphic LCD

Made by Citizen Watch Co., Ltd. Tokyo, Japan



Actual size shown

Specifications

1. Application

This specification shall be applied to Dot Matrix LCD Module G3245H-FR / G3245H-FH.

2. Composition

Display type	: B/W STN type
Dot structure	: 320 x 240 dot graphic display
Driving method	: 1/240 (min.) duty multiplex drive
Polarizer	: Glare

Block Diagram

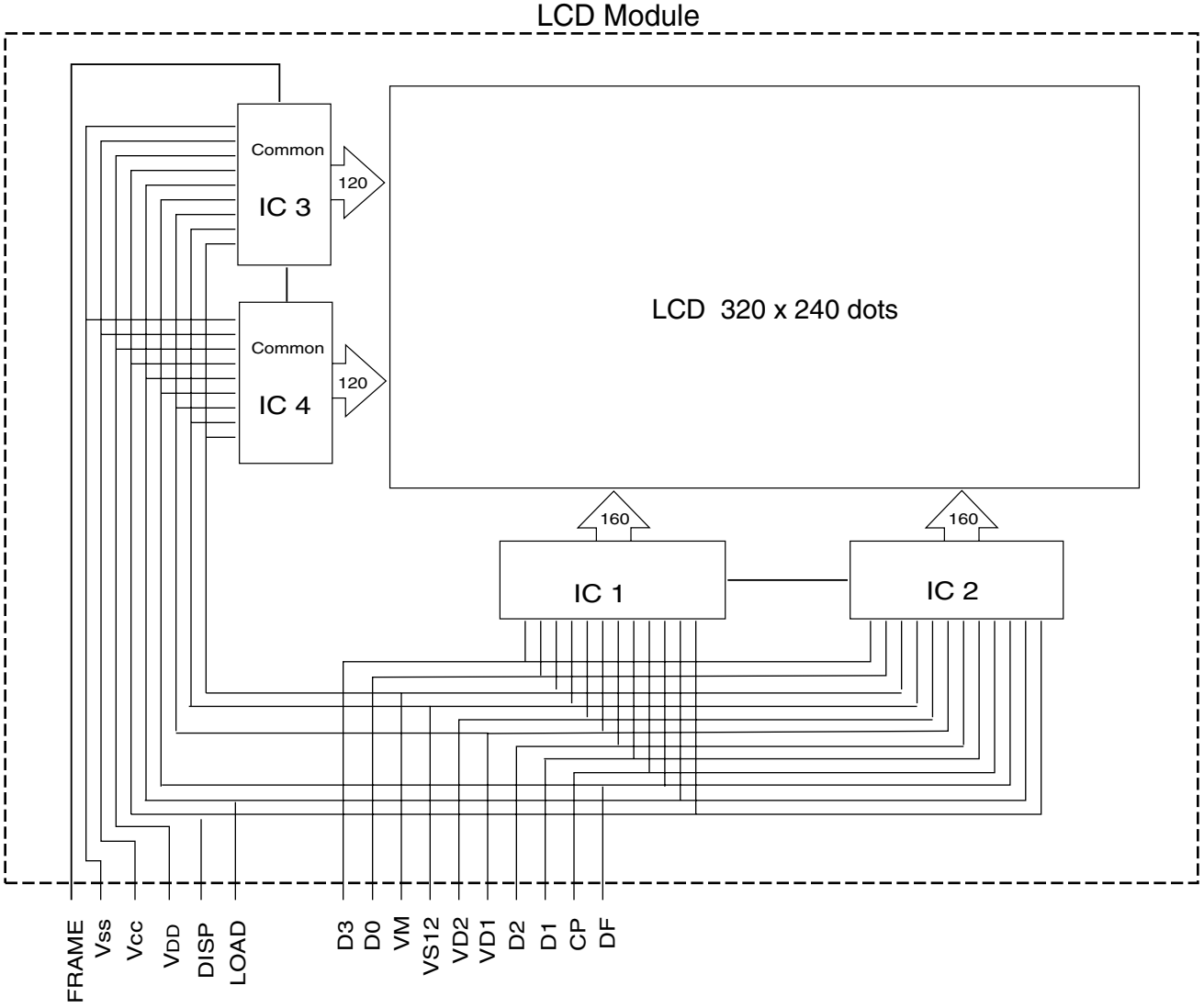


Fig 2-1 Block Diagram

3. Mechanical Specifications

3-1 Dimensions and weights

Module size	: 89.3 (W) x 68.4 (H) x 1.8 max (D) mm Typ.
Effective viewing area	: 78.8 (W) x 59.6 (H) mm
Weight	: TBD
Surface hardness	: 2H (by testing method of JIS K5400)

3-2 Dot dimensional drawing

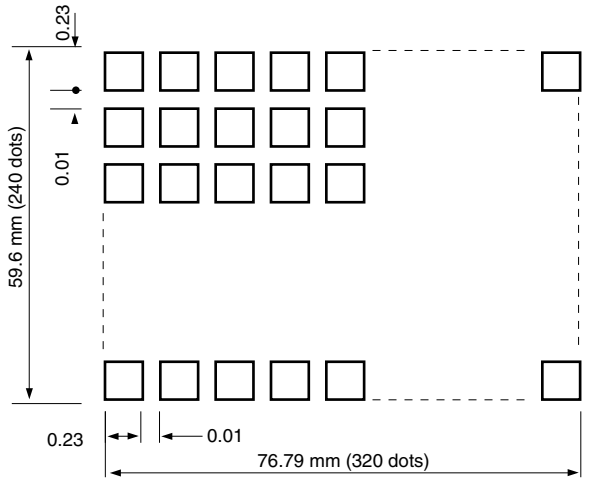


Fig 3-1

3-3 Input connector

Manufacturer : JST
Type 16FLZ-SM1
Connecting method : 0.5mm pitch FPC or FFC

4. Absolute maximum ratings

4-1 Electrical absolute maximum ratings

Item	Symbol	Min	Max	Unit	Remarks
Supply Voltage	VD1-VS12	0	+6.0	V	Note.1
	Vcc-Vss	0	+6.0	V	
	VD2-VS12	0	+6.0	V	
	VM-VS12	0	VD2	V	Note.2
	VDD-Vss	0	+32.0	V	
Signal Voltage	VIN	0	VD1	V	Note.3

Note 1 : VD1 ≥VD2 ≥VM ≥VS12, VDD ≥VD2, VS12 ≥VSS

Note.2 : If the LSI is used beyond the above maximum ratings, it may be permanently damaged. It should always be used within its specified operating range for normal operation to prevent malfunction or degraded reliability.

Note.3 : DISP, FRAME, DF, LOAD, CP, D3~0

4-2 Environmental absolute maximum ratings

Item	Specification	Remarks
Storage temperature	Max. +70°C Min. -20°C	Note 1 No condensation
Operating temperature	Max. +50°C Min. -10°C	Note1 No condensation

(Note) 95% RH Max.

5. Electrical specifications

5-1 Electrical characteristics

(GND = 0V, 25°C)

Item		Symbol	Condition	Min.	Typ	Max	Unit	Remark
Supply Voltage		VD1-VS12		3.1	3.3	3.5	V	Note.1
		VCC-VSS		0.95 (VD1-VS12)	VD1-VS12	1.05 (VD1-VS12)	V	
		VD2-VS12		2.97	3.0	3.03	V	
		VM-VS12		-	(VD2-Vs12)/2	-	V	
		VDD-VSS		8.0	-	30.0	V	
Input signal voltage	H	VSH		0.9VD3	-	VD3	V	Note.2
	L	VSL		0	-	0.1VD3	V	
Frame Freq.		1 FRAME		-	70	-	Hz	
Current Consumption		ID3	Ta=25°C VD3-GND=3.3V VAA-GND=15.8V VD1-VS12=3.0V	-	(0.7)	(3.00)	mA	Note.3
		IAA	VM-VS12=1.5V f FRAME=70Hz Duty=1/241 DF=13 Lines		(0.15)	(0.30)	mA	

Note.1 : VD3 =VD1 ≥ VD2 ≥ VM ≥ VS12 = GND , VDD ≥ VD2 , VS12 ≥ VSS
Note.2 : DISP, FRAME, DF, LOAD, CP, D3~0
Note.3 : Display pattern of current consumption as follows.

ID3.. Typ. value : Full screen 40 rows x 24 lines of charactor a.
Max value : Hatching of 8 dots horizontally X 1 dot vertically.
IAA.. Typ. value : Full screen 40 rows X 24 lines of charactor a.
Max value : ALL ON (ALL BLACK)

5-2 Contrast adjustment

The contrast of LCD differs depending on the charges in visual angle, ambient temperature and supply voltage. So, make adjustment by operating control knob where necessary.

Ta	VAA - GND V (TBD)	Driving condition	
50 deg	11.9 V	VD1 -VS12 = 3.3 V	fFRAME = 70 Hz
40 deg	13.8 V	VD2 -VS12 = 3.0 V	1/241 Duty
25 deg	15.8 V	VM - VS12 = 1.5 V	DF = 13 lines
0 deg	18.2 V		θ=0° , ø = 0°

5-3 Power circuit

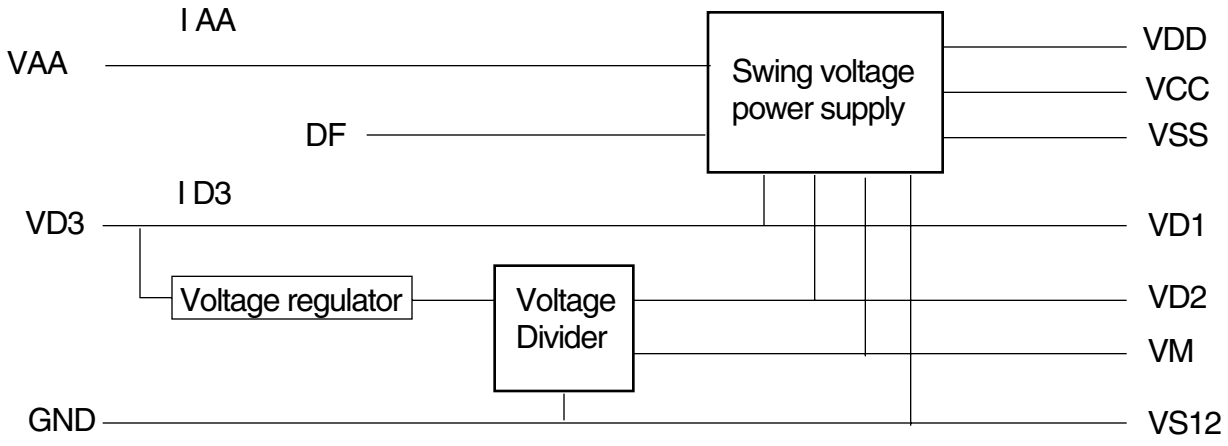


Fig 5-1

5-4 Power sequence

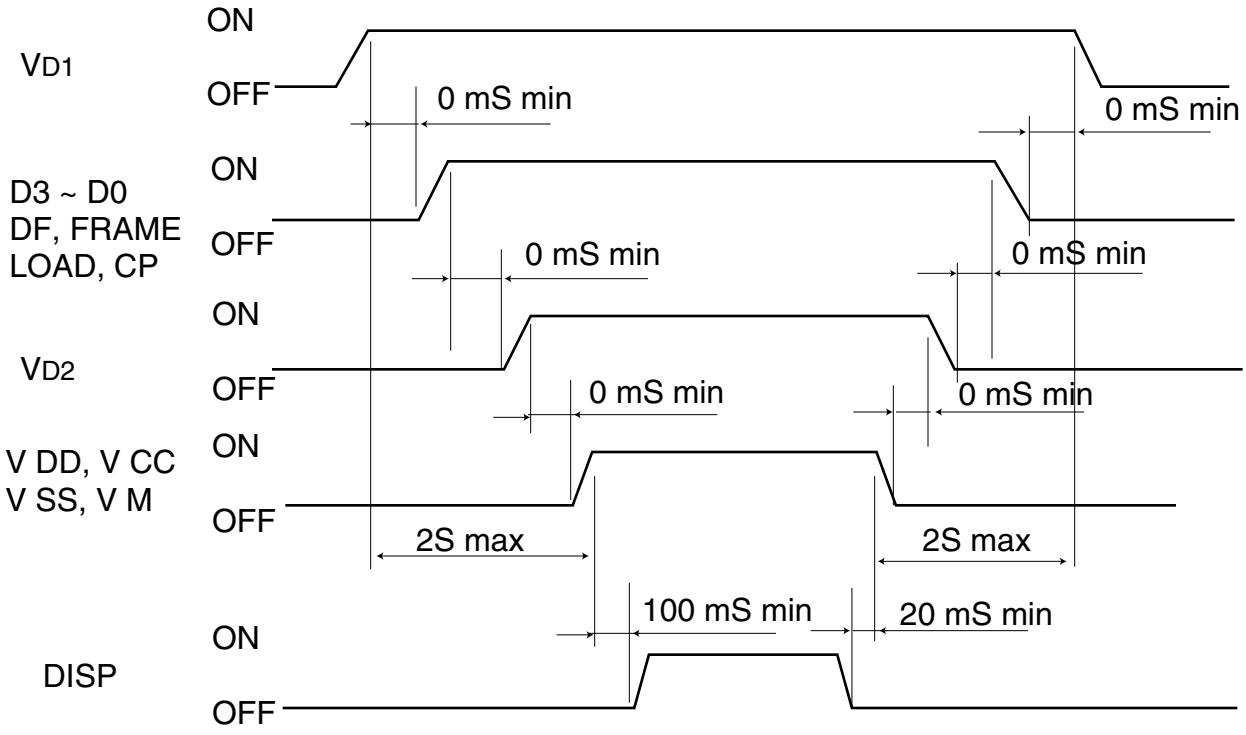


Fig 5-2

6. Interface Specifications

6-1 Terminal pin assignment of CN1

Pin No.	Symbol	I / O	Function
1	FRAME	IN	LCD OM electrode scanning data
2	V_{SS}	IN	LCD COM driving system - voltage power supply
3	VCC	IN	LCD COM driving system logic voltage power supply
4	VDD	IN	LCD COM driving system + voltage power supply
5	DISP	IN	Display control signal H: Normal L: Display off
6	LOAD	IN	Liquid crystal SEG electrode driving voltage output clock Liquid crystal COM electrode scanning data shift clock
7	D3	IN	Screen display data
8	D_0	IN	Screen display data
9	VM	IN	Non-selective power supply
10	VS12	IN	GND (Logic system -voltage power supply) LCD SEG driving system -voltage power supply.
11	VD2	IN	LCD SEG driving system +voltage power supply.
12	VD1	IN	Logic system +voltage power supply.
13	D2	IN	Screen display data
14	D1	IN	Screen display data
15	CP	IN	Screen display data input clock.
16	DF	IN	LCD AC driving signal.

(NOTE 1) Dc voltage is not allowed to apply to LCD panel as the driving signal, otherwise, the LCD will be damaged after a while.

6-2 Relationships of DATA input signal and LCD screen division

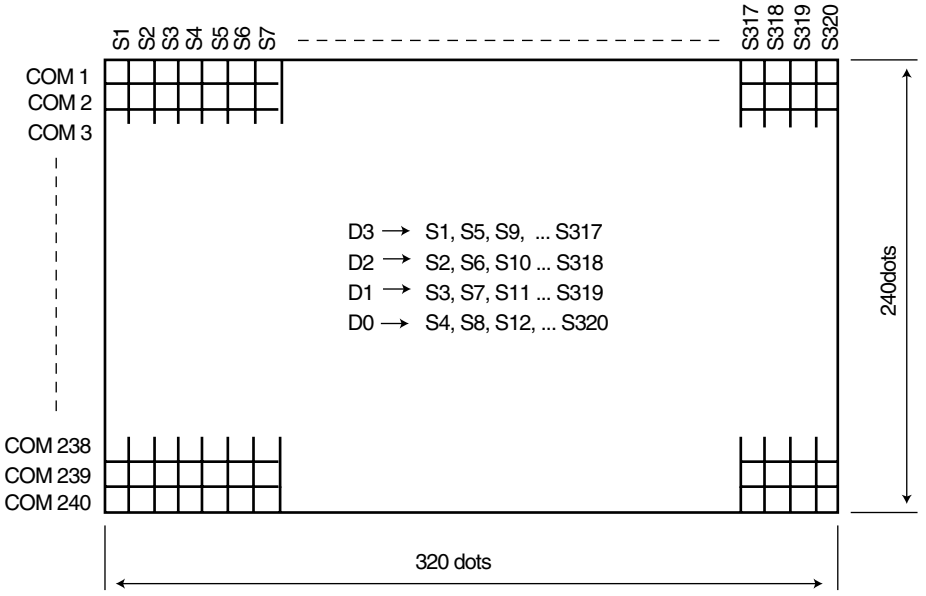


Fig 6-1 LCD screen

6-3 Timing chart

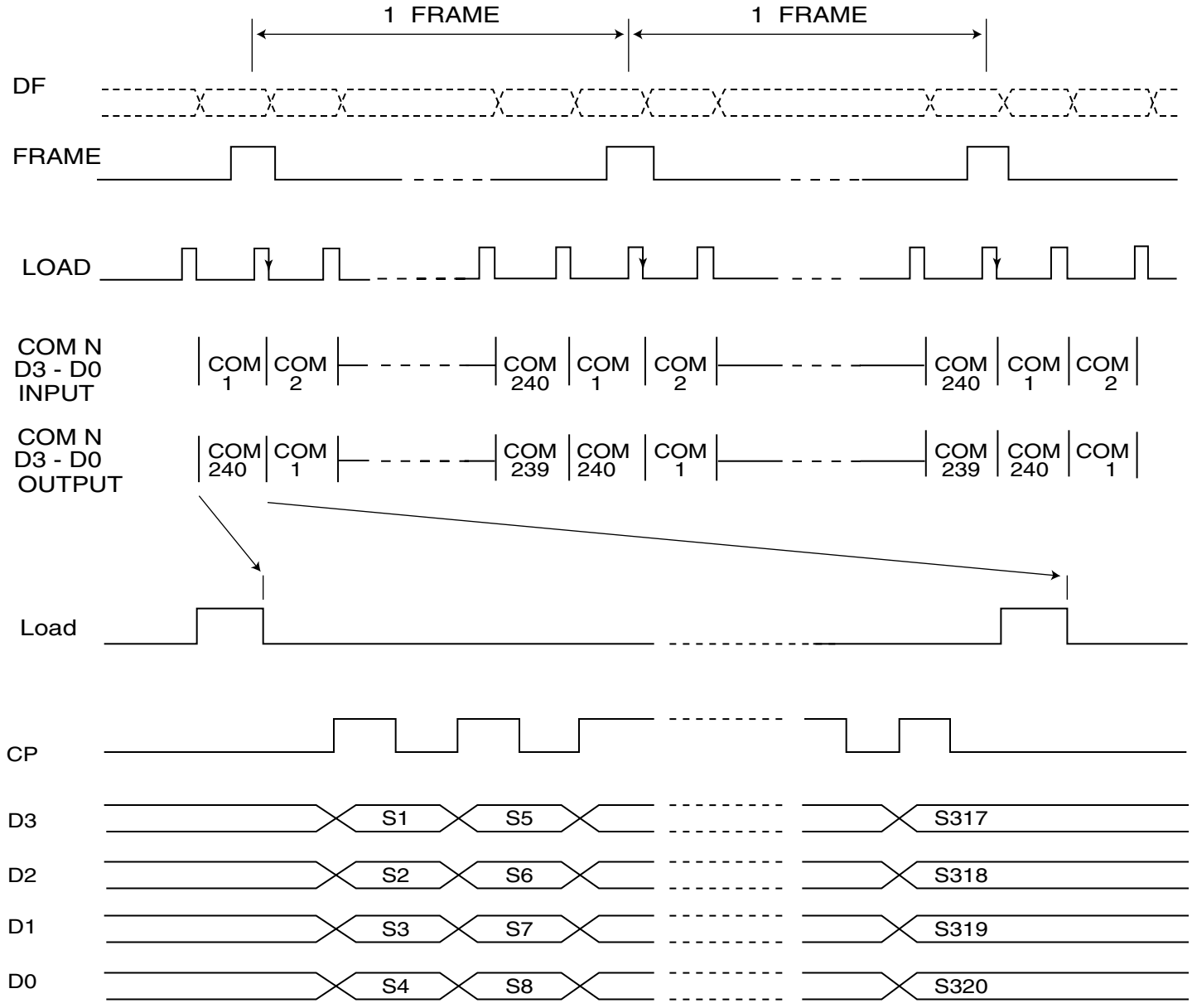


Fig 6-2

6-4 Switching characteristics

VD1-VS12 = 3.3V ± 0.1V, V_{DD} - Vss = 3.3V ± 0.1V

Item	Symbol	Test condition	Min	Typ	Max	Unit
Shift clock cycle(CP)	t CP		160	-	-	ns
Shift clock high level pulse width	t W(CH)		50	-	-	ns
Shift clock Low level pulse width	t W(CL)		50	-	-	ns
LOAD pulse width t	t W(LH)		2	-	-	∝s
	W(LL)		10	-	-	∝s
LOAD → CP time	tLC		120	-	-	ns
CP → LOAD time	tCL		120	-	-	ns
DATA set up time D3 ~ D0→ CP	t DSU		50	-	-	ns
DATA hold time CP →D3 ~ D0	t DHD		50	-	-	ns
LOAD → FRAME time	tLF		500	-	-	ns
FRAME → LOAD time	tFL		500	-	-	ns
FRAME set up time FRAME → LOAD	tSU(FR)		500	-	-	ns
FRAME hold time LOAD →FRAME	tHD(FR)		500	-	-	ns
LOAD DF time	tLD		0	-	300	ns
CP rise & fall time	t R (CP)		-	-	15	ns
	t F (CP)		-	-	15	ns
LOAD rise & fall time	t R(L)	15 ns	-	-		
	t F(L)		-	-	15	ns

Note. 1 LOAD signal should be with constant interval.

6-5 DF signal generation circuit

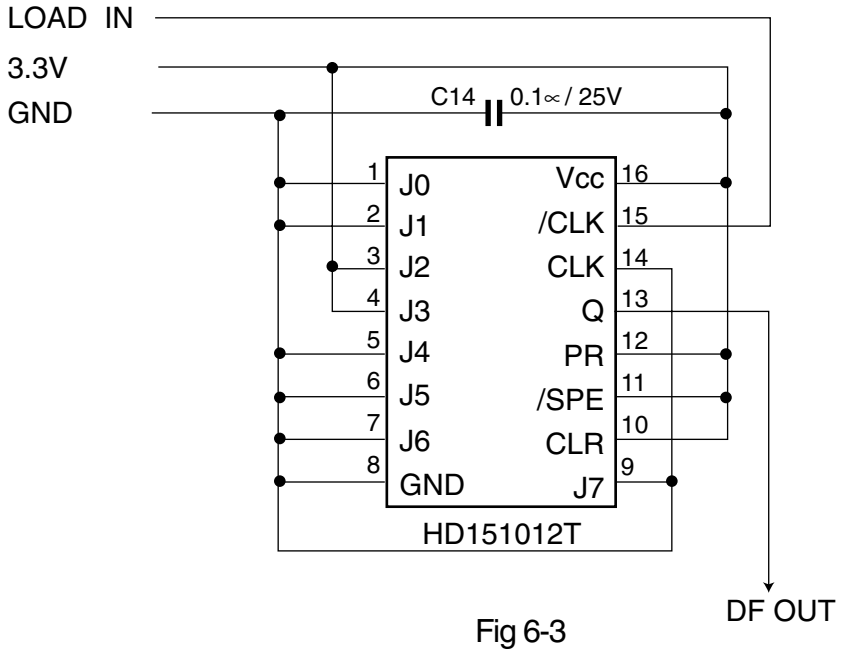


Fig 6-3

6-6 Switching Timing Chart

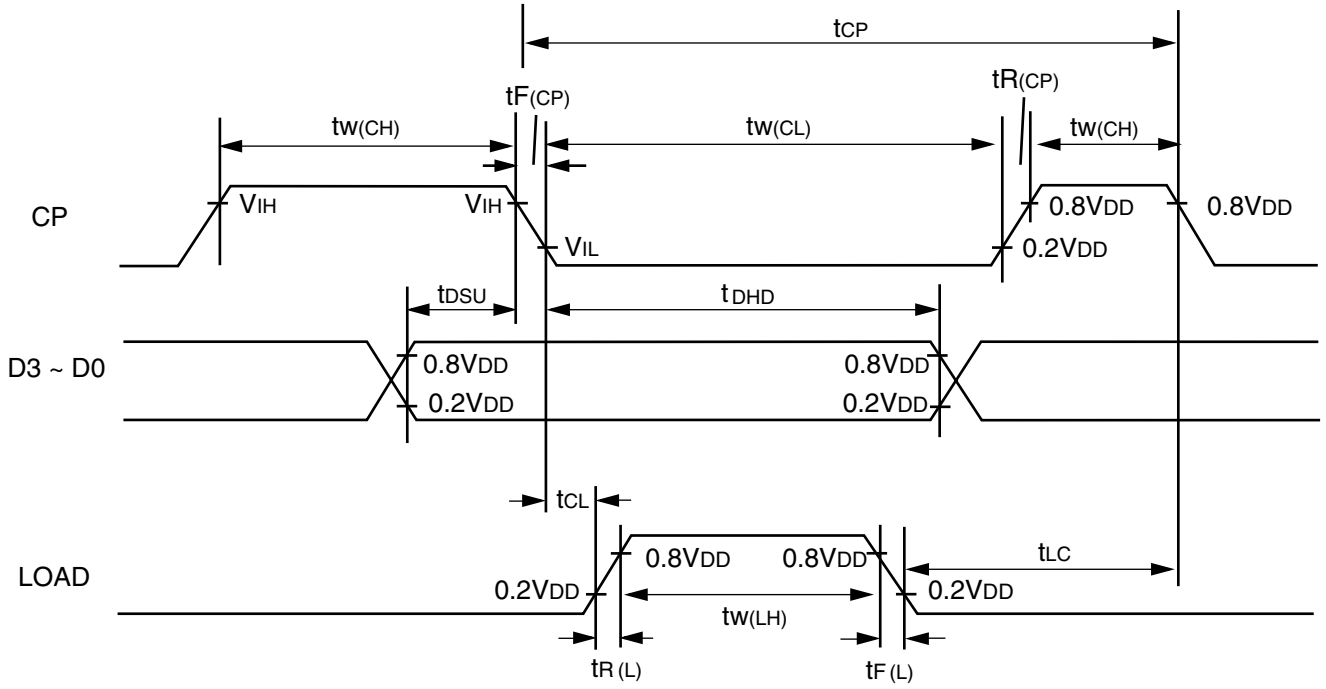


Fig 6-3

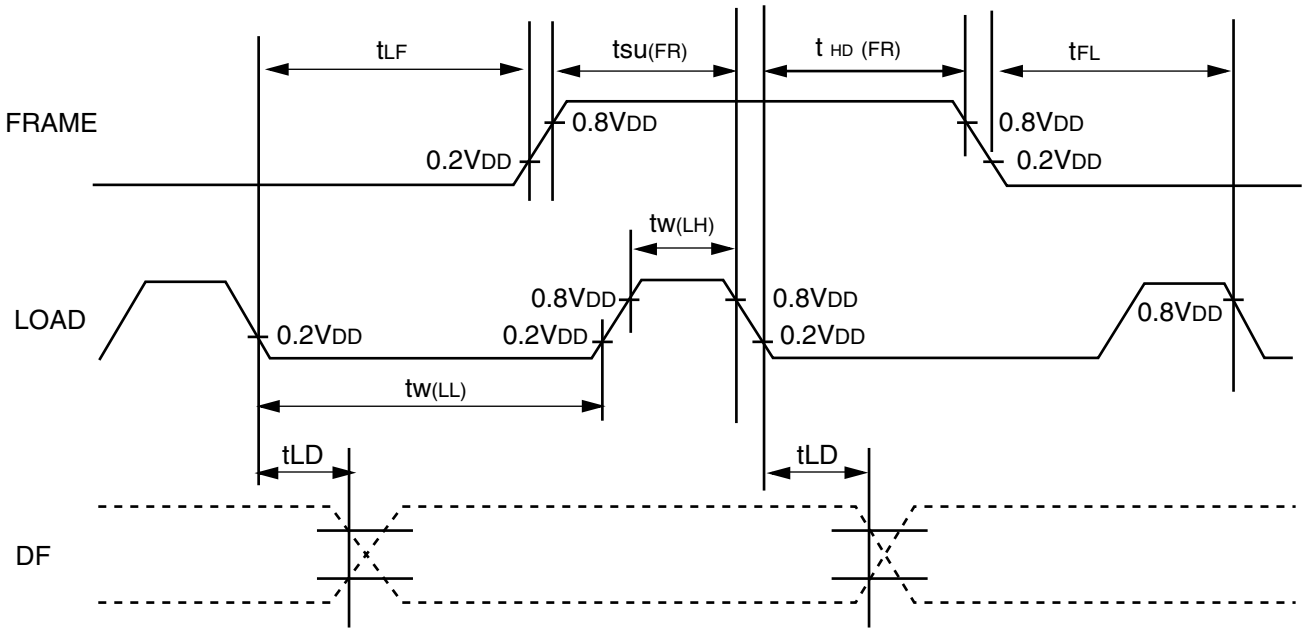


Fig 6-4

7. Electric Optical characteristics (Refer to Note 1 ~ Note 5)

LCD Driving condition : Ta = 25°C, VD3 = VD1 = 3.3V, VD2 = 3.0V, VM = 1.5V, VS12 = 0V
VAA = 15.8V (FIG.5-1), FRAME = 70Hz, DF = 13 lines, Duty = 1/241

Item		Symbol	Min	Typ	Max	Unit	Condition
Turn On Time Turn Off Time		t_{ON} t_{OFF}	-- --	180 370	270 560	ms ms	= 0°, ø=0°
Contrast Ratio		CR	--	TBD	--		ø=0°, θ=0°
Visual Angle Range	Front, rear	θ_1	TBD ≤ θ_1 ≤ TBD			deg.	ø = 0°, CR≥2.0
	Right, left	θ_2	TBD ≤ θ_2 ≤ TBD			deg	ø =90°, CR≥1.5
Viewing Direction		--	6:00				--

(Note 1) Optical characteristics measurement system (Reflection)

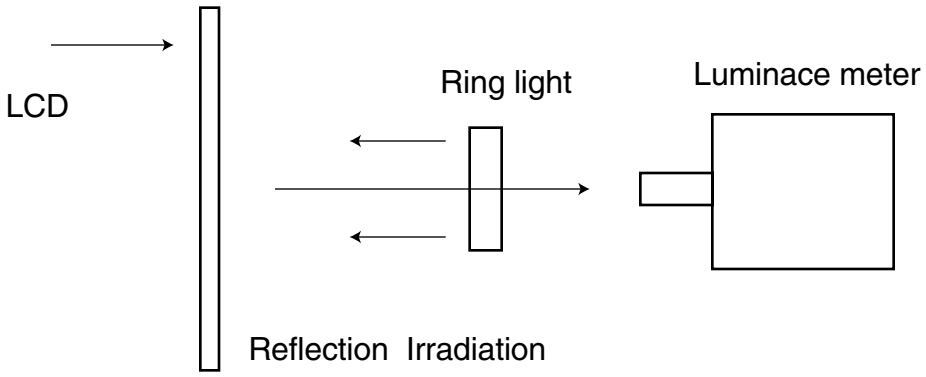


Fig 7-1

(Note 2) Definition of response time

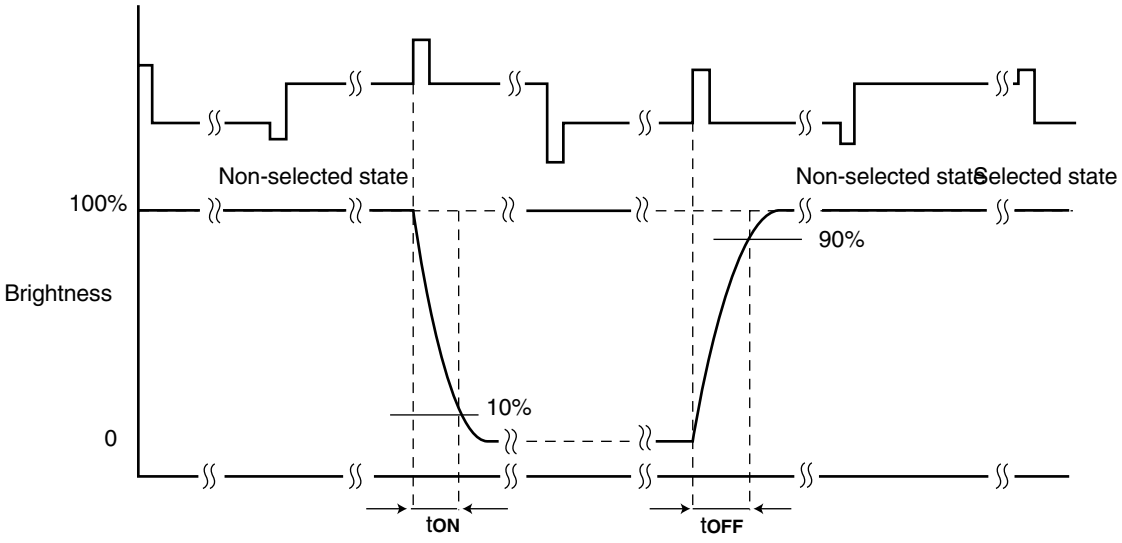


Fig 7-2

(Note 3) Definition of θ and Ø

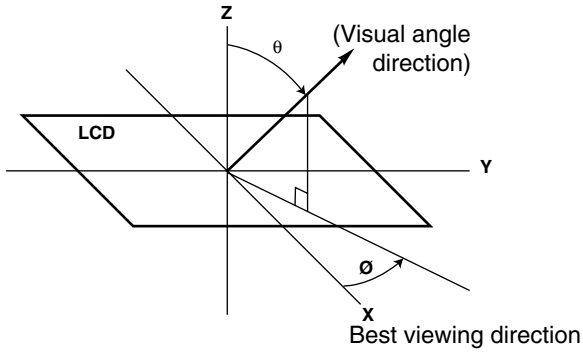
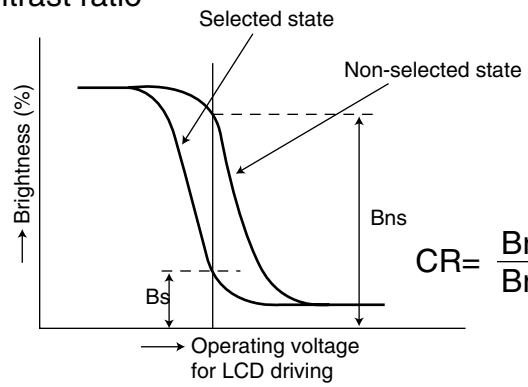


Fig 7-3

(Note 4) Definition of contrast ratio



$$CR = \frac{\text{Brightness at selected state (Bs)}}{\text{Brightness at non-selected state (Bns)}}$$

Fig 7-4

(Note 5) Definition of visual field enlarging direction

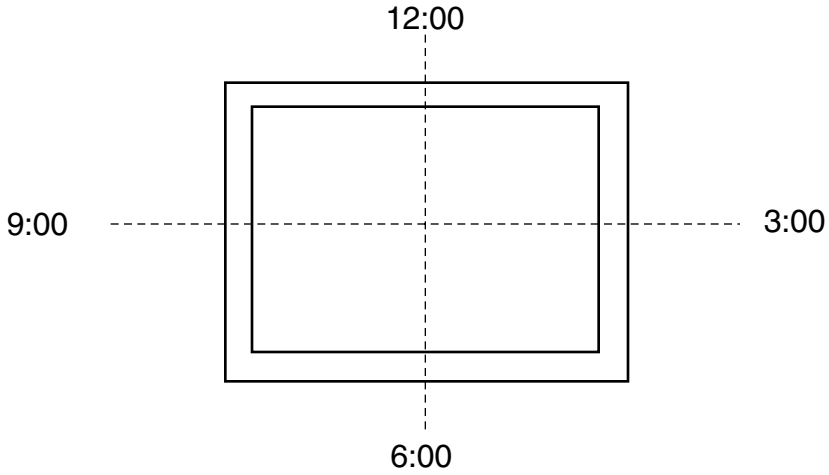
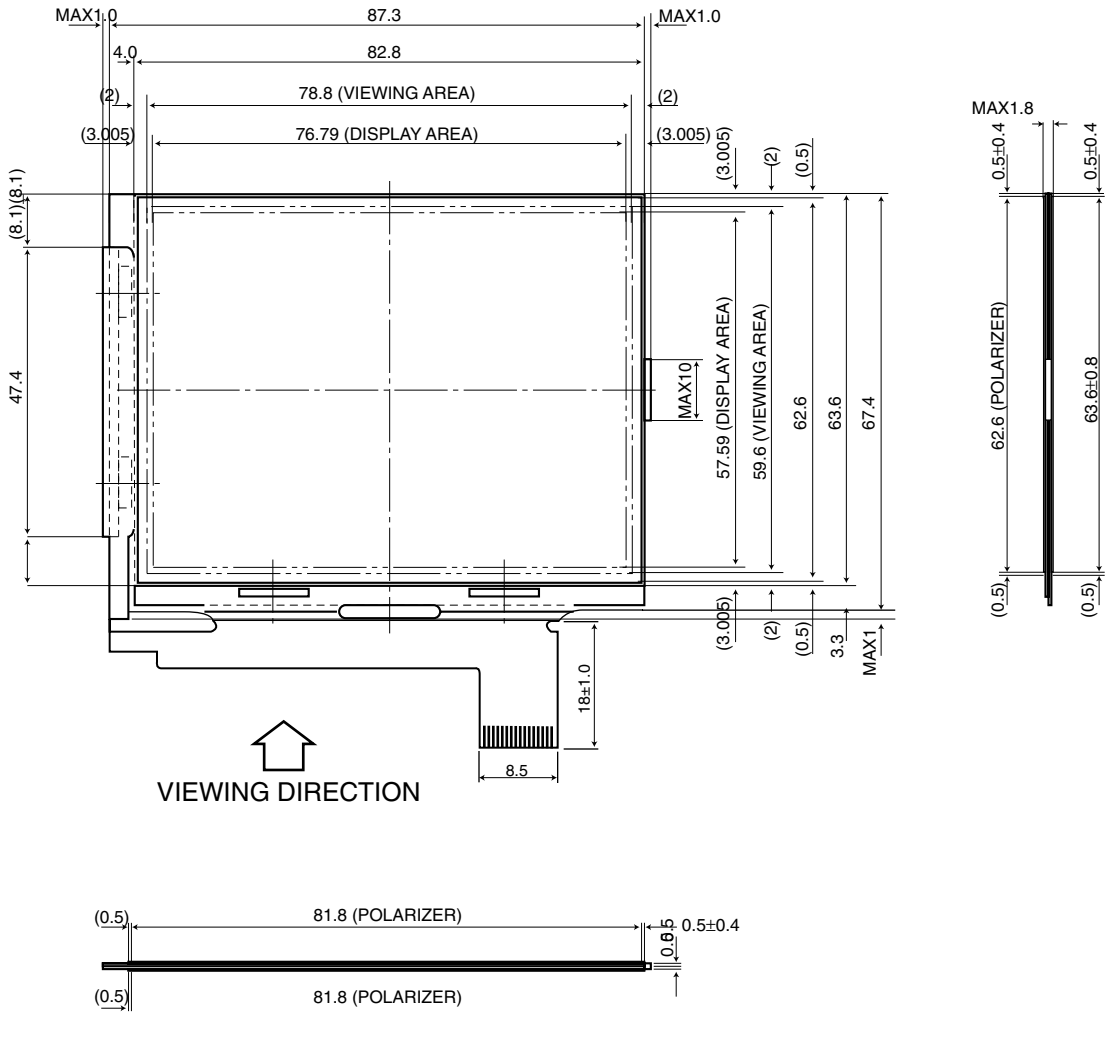


Fig 7-5

Dimensional drawing



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