SP14Q002 320*240 Dots

FEATURES

- **Black on White Film STN Type**
- **Transmissive Mode**
- **High Brightness CFL Backlight**
- **High Contrast LC Material**

MECHANICAL DATA

Item	Value	Unit
Module Dimensions	167.0*109*8.5	mm
Viewing Area	120*89	mm
Resolution	320*240	dots
Dot Size	0.345*0.345	mm
Dot Pitch	0.36*0.36	mm
Weight	160	g

OPTICAL DATA

Item	Symbol	Condition	Min	Typ	Max	Unit
Contrast Ratio	K	Ø=10°, Q=0°, Note 1	-	20	-	-
Brightness	-	T=25°C, Note 7	-	80.0	-	cd/m^2
Viewing Direction		-		6		o'clock
Viewing Angle	Ø2 - Ø1	K=2, Note 1	-	40	-	degree
Response Time (Rise)	t_R	Ø=10°, Q=0°, Note 1	-	120	-	ms
Response Time (Fall)	t_F	Ø=10°, Q=0°, Note 1	-	150	-	ms

ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Min	Max	Unit
Supply Voltage (Logic)	V_{DD} - V_{SS}	-	0	6	V
Supply Voltage (LC Drive)	V_{DD} - V_{EE}	-	0	27.5	V
Input Voltage	V_I	Note 2	-0.3	0.3+VDD	V
Operating Temperature	T_{OP}	Note 5,6	0	50	°C
Storage Temperature	T_{ST}	Note 5,6	-20	60	°C

DATA INTERFACE PIN ASSIGNMENT

Pin No	Symbol	Level	Function
1-4	D0 - D3	H/L	Display data
5	Not DISP OFF	H/L	High for ON / Low for OFF
6	FRAME	H	First Line Marker
7	NC	-	Do not connect
8	LOAD	H->L	Data latch
9	CP	H->L	Data shift
10	VDD	-	Power supply for logic circuit
11	VSS	-	Ground
12	VEE	-	Power supply for LC drive circuit
13	V0	-	Operating voltage for LC driving
14	FGND	-	Front panel ground

CFL INTERFACE PIN ASSIGNMENT

Pin No	Symbol	Level	Function
1	VCFL	-	Power supply for CFL
2	NC	-	No connection
3	NC	-	No connection
4	VCFL	-	CFL Ground

ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage (Logic)	V_{DD} - V_{SS}	-	4.75	5.0	5.25	V
Supply Voltage (LC Drive)	V_{EE} - V_{SS}	-	-20.9	-22.0	-23.1	V
Supply Current	I_{DD}	Note 3	-	6	-	mA
	I_{EE}	Note 3	-	5	-	mA
Input Voltage (High Level)	V_{IH}	High Level, Note 2	0.8* VDD	-	VDD	V
Input Voltage (Low Level)	V_{IL}	Low Level, Note 2	0	-	0.2* VDD	V
Frame Frequency	f_{FLM}	-	70	75	80	Hz
Duty Ratio		-	-	1/240	-	-
Recommended LC Drive Voltage	V_{DD} -V_O	Duty=1/240 T=0°, Ø=10°, Note 4	-	23.0	-	V
		Duty=1/240 T=25°C, Ø=10°, Note 4	-	22.0	-	V
		Duty=1/240 T=40°C, Ø=10°, Note 4	-	21.0	-	V
Backlight Lamp Voltage	V_{BL}	T=25°C	-	300	-	Vrms
Backlight Lamp Frequency	f_{BL}	T=25°C		70	85	kHz
Backlight Lamp Current	I_{BL}	T=25°C	4	5	6	mArms
Lamp Start Voltage	V_S	T=25°C	1000	-	-	V
Backlight Lamp Lifetime	T_L	T=25°C	15.000	20.000	-	hrs

TIMING CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit
Clock frequency	fCP	-	-	6.5	MHz
Clock pulse width	tw	63	-	-	ns
Rise, Fall time	tr, tf	-	-	20	ns
Data set up time	tDSU	50	-	-	ns
Data hold time	tDHD	50	-	-	ns
LOAD set up time	tLSU	80	-	-	ns
LOAD -> Clock time	tLC	80	-	-	ns
FRAME set up time	tsetup	100	-	-	ns
FRAME hold time	thold	100	-	-	ns
LOAD pulse width	twc	125	-	-	ns

INVERTER AND CONNECTORS

Recommended Inverter	Starter Kit
HITACHI INVC132, INVC196	START691x
Lamp Connector	**Lamp Housing Connector**
JAE IL-G-4S-S3C23	-

Note1: Definition of optical data, see page 84

Note 2: Applied to NotDISP.OFF, FRAME, LOAD, CP, D0-D3

Note 3: FRAME=75Hz, D0-D3=0.1.0.1...VDD-VEE=23.7V,T=25°C

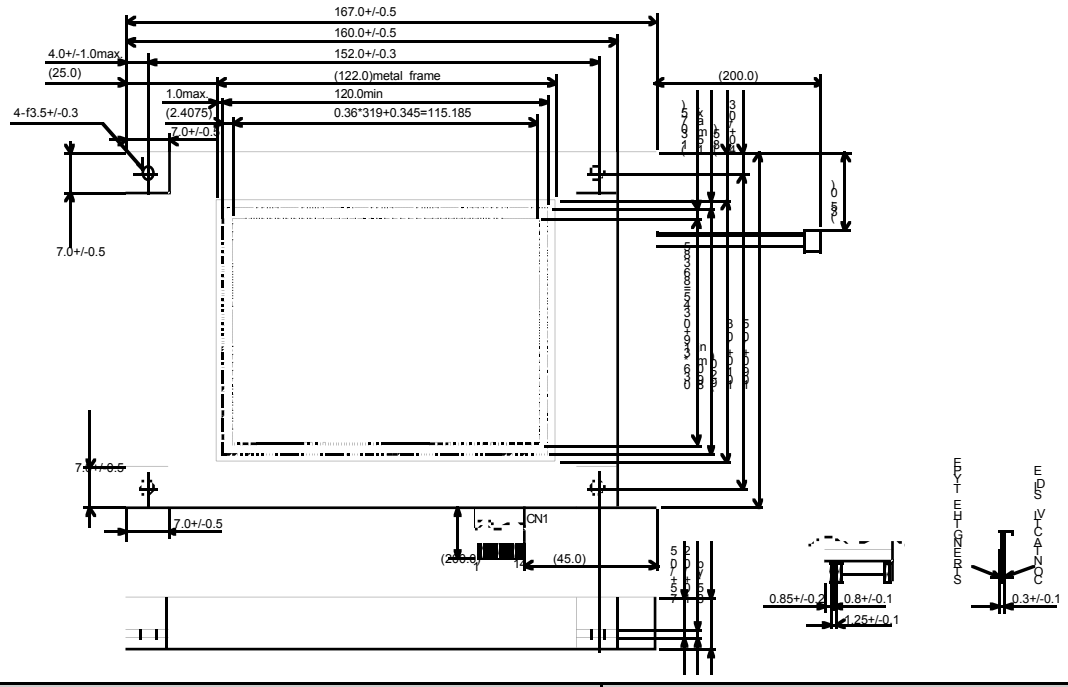
Note 4: Recommended LC driving voltage may fluctuate about +-/1.0V by each module

Note 5: Background colour of the LCD changes depending on temperature. Between 40-50°C optical characteristics of the LCD like contast and viewing angle change but the display remains readable.

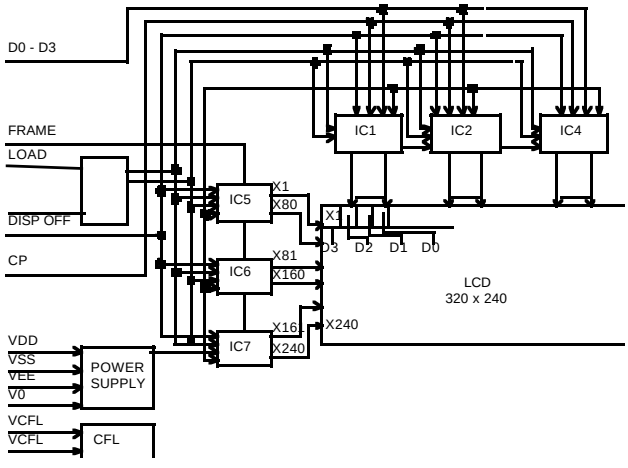
Note 6: Storage at -20°C < 48 hr, at 60°C < 168 hr

Note 7: Measurement after 10 minutes of CFL operating. Brightness control at100 %

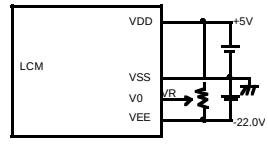
MECHANICAL DIMENSIONS



BLOCK DIAGRAM

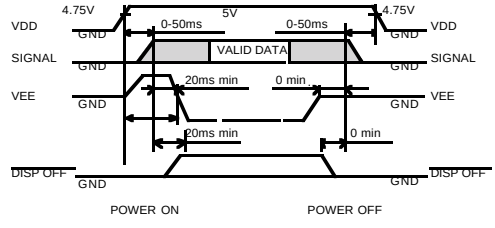


POWER SUPPLY / POWER UP TIMING DIAGRAM

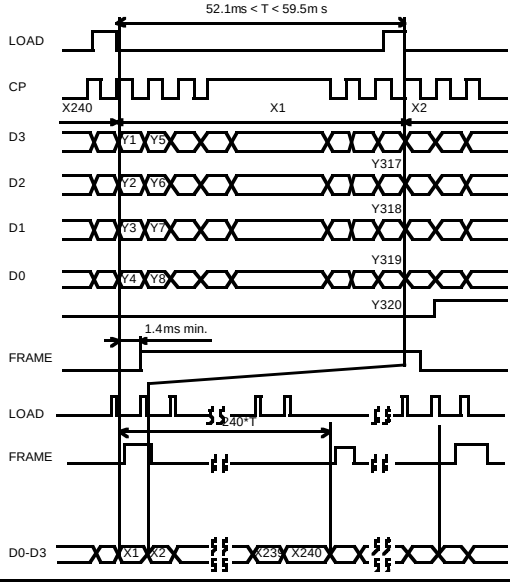


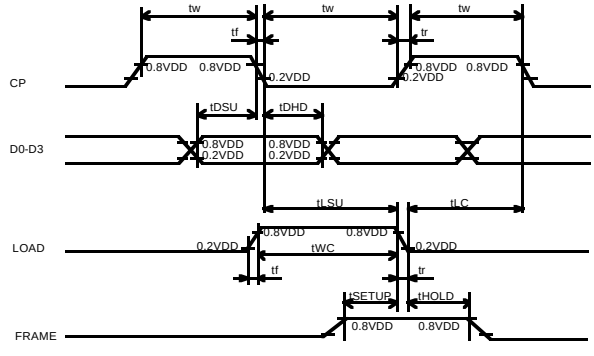
NOTE 1: IT IS RECOMMENDED TO ADD FUS (1 A) TO VDD LINE

NOTE 2: VR = 10kW



INTERFACE TIMING DIAGRAM





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