

TFT-LCD Module
Model Name : LC201V1-A1SO

27 Jan 2000

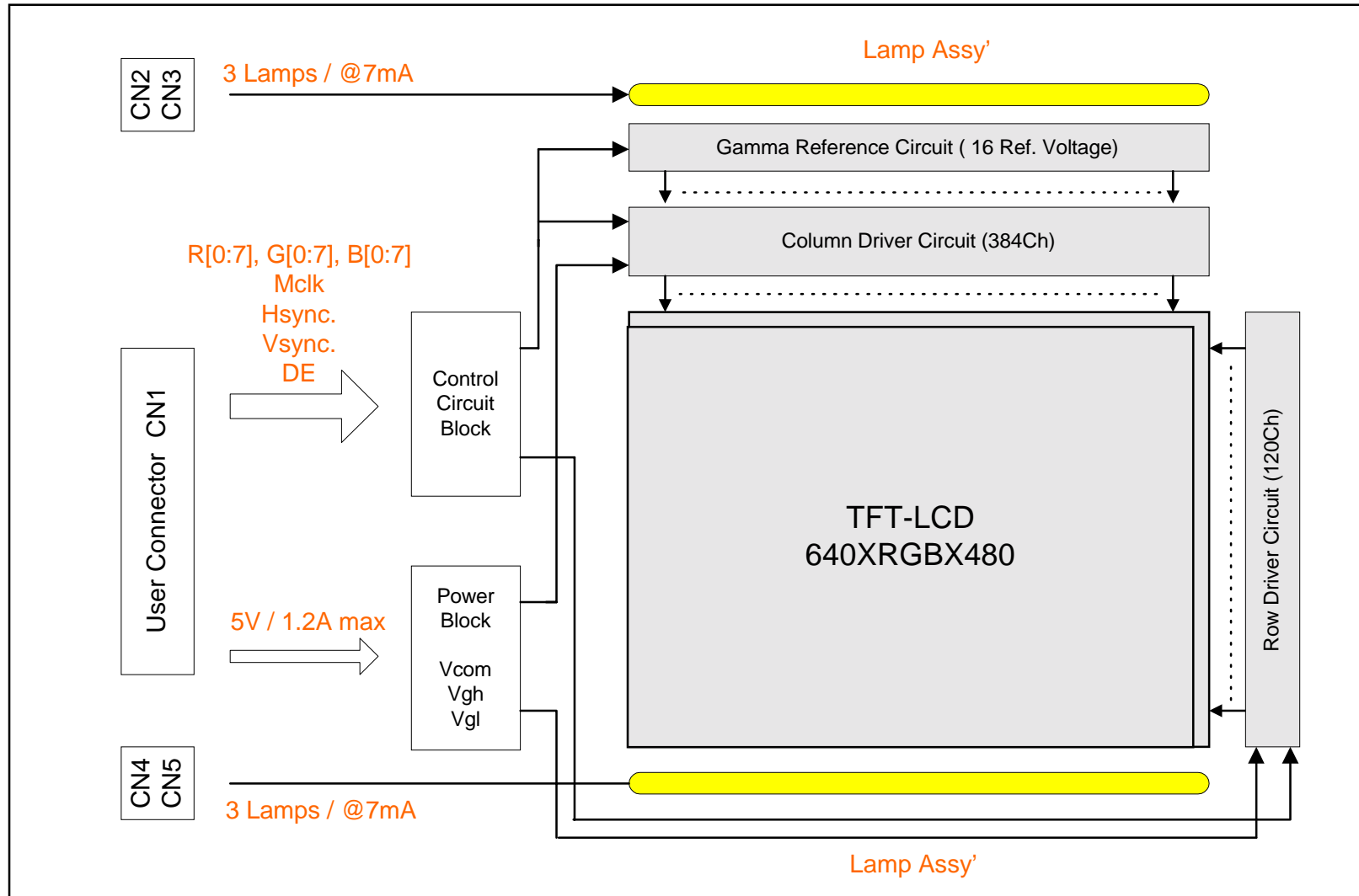
Product Specification*Preliminary*

Version No.	Date	Page	Description
0.1	7 Jan 2000	-	First Draft
0.2	26 Jan 2000	5	amended: B/L Operating Frequency
		10	changed : Module Connector Pin Configuration Connector Type (Hirose 40P -> Jae 50P)
		13	changed : Module Outline Dimension (Front View)
		14	changed : Module Outline Dimension (Rear View)

General Features

Active Screen Size	: 20.1" (408 mm X 306mm)	* 509.99 [mm] Diagonal
Outline Dimension	: 450.0(H) X 348.7(V) X 20.0(24.0)* [mm]	* (24.0) : thickness of circuit device was considered. column TCP bending type
Pixel Pitch	: 0.6375 [mm] X 0.6375[mm]	
Pixel Format	: 640 Horiz. by 480 Vert. Pixels, RGB Stripe Arrangement	
Color Depth	: 8 Bits , 16.7M Colors	* Dot Inversion
Brightness	: 400 [cd/m²] , 9300K	* average of 5 points measurement * 3 lamps at each side, edge light type
Lamp Life Time	: 30,000Hr (min) / 40,000Hr (typ.) @ 7.0mA	
Response Time	: <30 [msec]	
Power Consumption	: Total <40 [W] ; under 4W for electronics.	
Weight	: (3,800) [g]	
Display Mode	: Transmissive mode, Normally white	
Polarizer	: ; Surface hardness 3H, (Haze 12%), Anti glared	
Input Signals	: Standard VGA CMOS(TTL) +3.3V logic and +5V Power Input * DE(data enable) should be used or Sharp sync. mode used.	

General Features



Absolute Maximum Ratings:

Parameter	Symbol	Values		Unit	Remark
		Min	Max		
Input Voltage (Logic Signal)	V _i	-0.3	+3.6	V	
Power Input Voltage	V _{cc}	0	+6.0	V	
Operating Temperature	T _{op}	0	50	.	
Storage Temperature	T _{st}	-10	+60	.	

Electrical Characteristics:

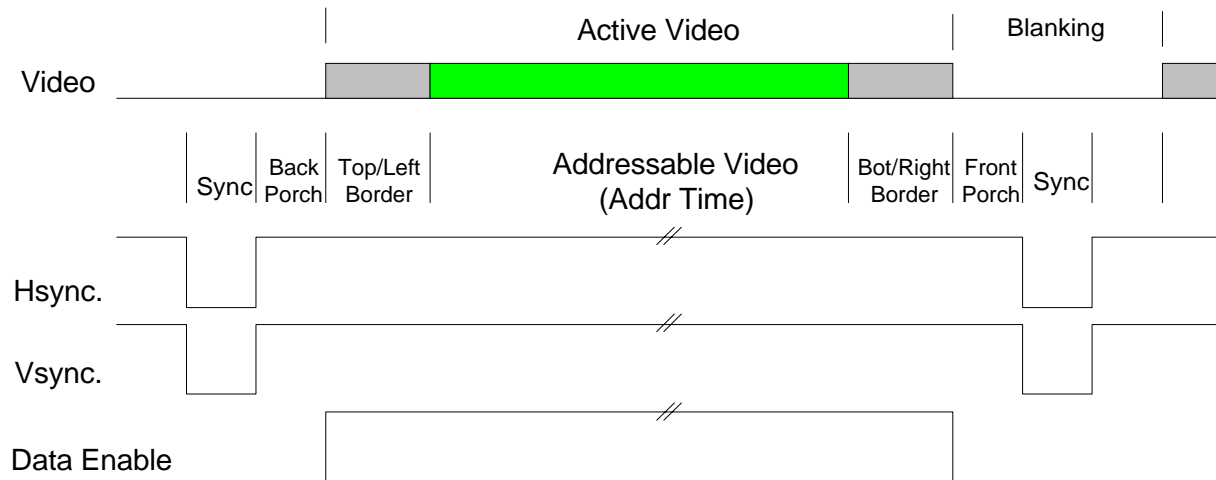
T_a = 25C

Parameter	Symbol	Values			Unit	Remark
		Min	Typ	Max		
Module :						
Power Supply Input Voltage	V _{cc}	+4.5	+5.0	+5.5	V	+/-10%
Power Supply Input Current	I _{cc}		750	1,200	mA	
Power Consumption	P _c		3.75	6.0	Watt	
Rush Current	I _{RUSH}		-	1.8	A	
Lamp						
Operating Voltage	V _{BL}	(1,070)	(850)	(820)	V	
Operating Current	I _{BL}	3.0	7.0	9.0	mA	
Power Consumption	P _{BL}		36	-	Watt	
Kick-off Voltage				1,800		0.
				1,300		25.
Operating Frequency		30	40	60	kHz	
Life time		(30,000)	(40,000)	(50,000)	Hrs	1)

1) Specified life time is related to the lamp current and room temperature.

Logic Input Signals (3.3V) : R [0:7], G[0:7], B[0:7] DCLK Hsync. Vsync. Data Enable

Hor Dots	=	640	/Pixel					
Ver Lines	=	480	/Line					
Hor Frequency	=	31.469	KHz	=	31.78	usec	/ Line	
Ver Frequency	=	60	Hz	=	16.7	msec	/ Frame	Hor Front Porch = 16 Pixels 0.64 usec
Dot Clock	=	25.175	MHz	=	39.72	nsec		Hor Sync Time = 96 Pixels 3.81 usec
Hor Total Time	=	800	Pixels	=	31.78	usec		Hor Back Porch = 48 Pixels 1.91 usec
Hor Addr Time	=	640	Pixels	=	25.42	usec		
(Data Enable Time)								Ver Front Porch = 10 Lines 317.78 usec
Hor Blank Time	=	160	Pixels	=	6.36	usec		Ver Sync Time = 2 Lines 63.56 usec
Actual Data	=	640	Pixels	=	25.42	msec		Ver Back Porch = 33 Lines 1.05 msec
Ver Total Time	=	525	Lines	=	16.68	msec		
Ver Addr Time	=	480	Lines	=	15.25	msec		Left Border = Pixels 0.00 usec
Ver Blank Time	=	45	Lines	=	1.43	msec		Right Border = Pixels 0.00 usec



Timing Characteristics

Parameter		Symbol	Min	Typ	Max	Unit	Remark
Clock	Frequency	1/Tc	-	25.18	28.33	MHz	-
	High Time	Tch	5	-	-	ns	-
	Low Time	Tcl	10	-	-	ns	-
Data	Setup Time	Tds	5	-	-	ns	-
	Hold Time	Tdh	10	-	-	ns	-
Horizontal Sync. Signal	Cycle	Th	30.00	31.78	-	us	-
			770	800	900	clock	-
	Pulse Width	Thp	2	96	200	clock	-
Vertical Sync. Signal	Cycle	Tv	515	525	560	line	-
	Pulse Width	Tvp	2	-	34	line	-
Horizontal Display Period		Thd	640	640	640	clock	-
Hsync-Clock Phase difference		Thc	10	-	Tc-10	ns	-
Hsync.-Vsync. Phase difference		Tvh	0	-	Tc-Thp	clock	-

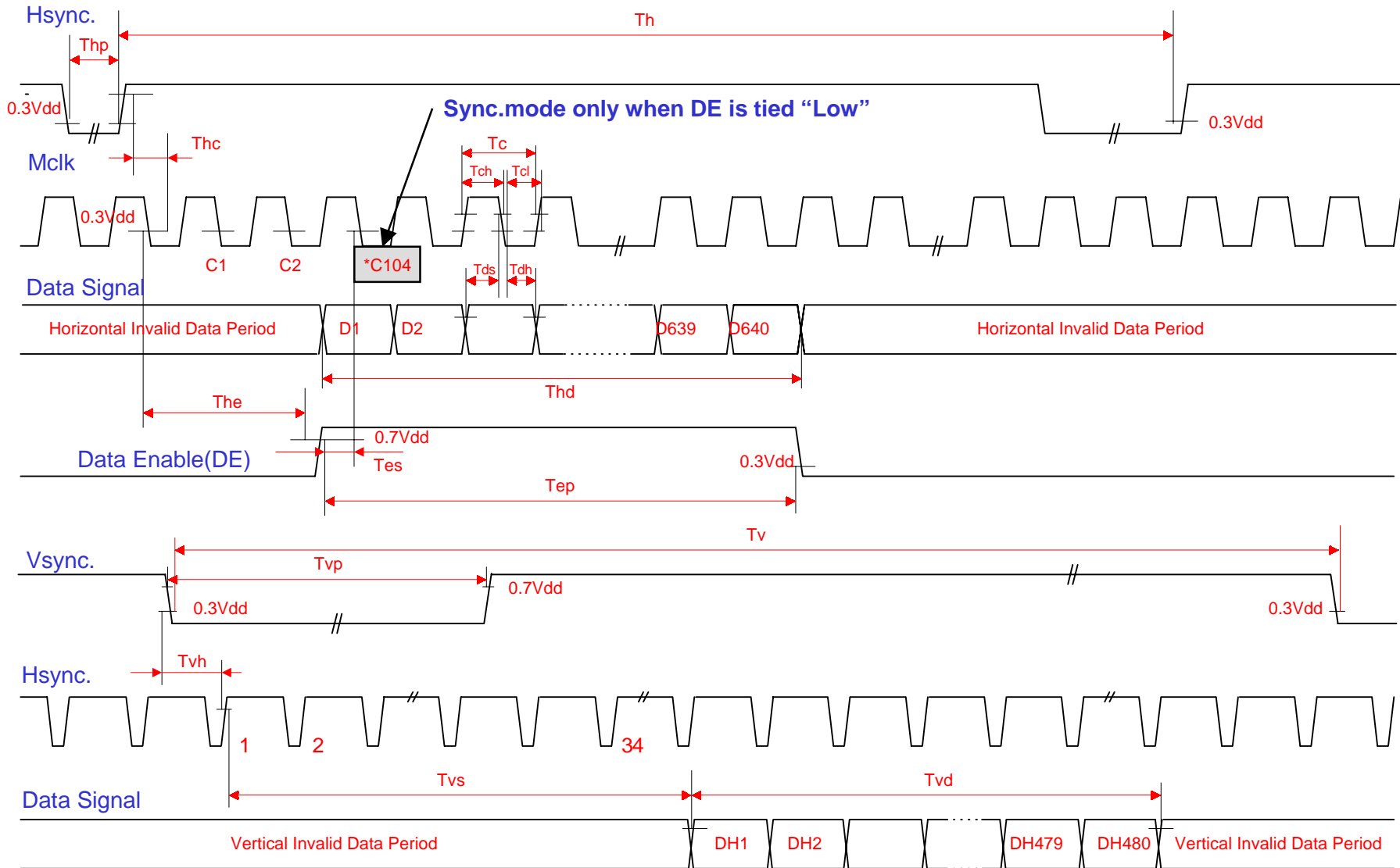
Horizontal Display Position

Parameter		Symbol	Min	Typ	Max	Unit	Remark
Enable Signal	Setup Time	Tes	5	-	Tc-10	ns	-
	Pulse Width	tep	2	640	640	clock	-
Hsync.-Enable Signal Phase difference		The	44	-	164	clock	-

Vertical Display Position

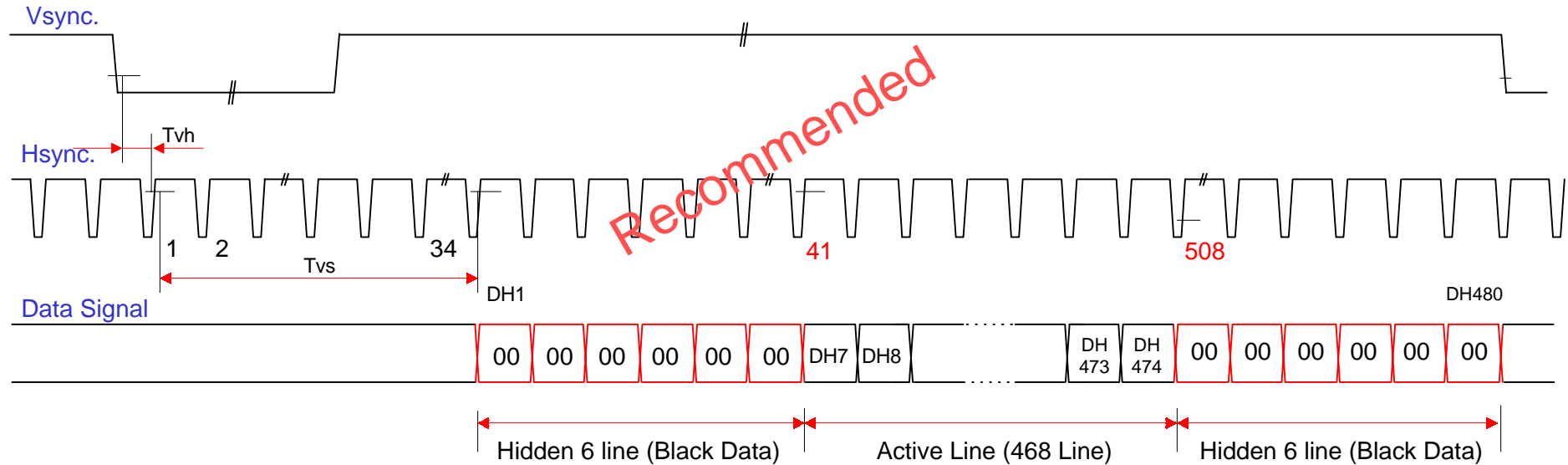
Mode	Tvs	Tvd	Unit	Remark
480	34	480	line	-

Input Signal Waveforms



Input Signal Waveforms : 468 Line Mode

- To eliminate the noisy display near by Vsync. Following 6 lines, after counting 34H from falling edge of Vsync should have black data and the same manner, last 6 line should have black data also by electrically.



Module Connector Pin Configuration

Pin	Symbol	Description	Remark	Pin	Symbol	Description	Remark
1	Dummy			26	R0	Red Data (LSB)	
2	Dummy			27	GND		
3	Dummy			28	G7	Green Data (MSB)	
4	GND			29	G6		
5	GND			30	G5		
6	VCC	Power Input (+5.0V)		31	G4		
7	VCC	Power Input (+5.0V)		32	GND		
8	VCC	Power Input (+5.0V)		33	G3		
9	VCC	Power Input (+5.0V)		34	G2		
10	GND			35	G1		
11	Hsync	Horizontal Sync.		36	G0	Green Data (LSB)	
12	Vsync	Vertical Sync.		37	GND		
13	GND			38	B7	Blue Data (MSB)	
14	DE	Data Enable		39	B6		
15	GND			40	B5		
16	DCLK	Main clock		41	B4		
17	GND			42	GND		
18	R7	Red Data (MSB)		43	B3		
19	R6			44	B2		
20	R5			45	B1	Blue Data (LSB)	
21	R4			46	B0		
22	GND			47	GND		
23	R3			48	GND		
24	R2			49	Dummy		
25	R1			50	Dummy		

* Module Connector Type : [IL-FHR-50S-HF \(for FFC use\)](#) manufactured by JAE

Backlight Connector Pin Configuration

Pin	Symbol	Description	Remark
1	HV	High Voltage Input	
2	HV	High Voltage Input	
3	HV	High Voltage Input	

- Backlight Connector(CN2 & CN4) : [BHR-03VS-1\(3Pin\)](#) and [mating connector is SM03\(4.0\)B-BHS-1-TB](#) manufactured by JST.
- [Additional connectors\(CN3 & CN5\) for GND is needed. \(TBD\)](#)

Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Surface Luminance	L_{WH}		400		cd/m ²	
Contrast Ratio	CR		400			
Luminance Variation	Δ White		TBD	TBD		
Response Time	Tr		30	-	msec	
Rise Time	Trr		-			
Decay Time	Trd		-			
CIE Coordinates						
White	x_W		0.28			9300K
	y_W		0.29			
Red	x_R		TBD			
	y_R		TBD			
Green	x_G		TBD			
	y_G		TBD			
Blue	x_B		TBD			
	y_B		TBD			
Viewing Angle						
x axis, right ($\varphi=0$)						
x axis, left ($\varphi=180$)	$\ominus xr$		60		degree	
y axis, up ($\varphi=90$)	$\ominus xl$		60			
y axis, down ($\varphi=270$)	$\ominus yu$		45			
	$\ominus yd$		45			

Mechanical Characterists:**Outline Dimension :**

Horizontal	450.0 [mm]	
Vertical	348.7 [mm]	
Depth	20.0 [mm] / 24.0 [mm]	* (24.0) : thickness of circuit device was considered

Bezel Area :

Horizontal	413.0 [mm]
Vertical	311.0 [mm]

Active Area :

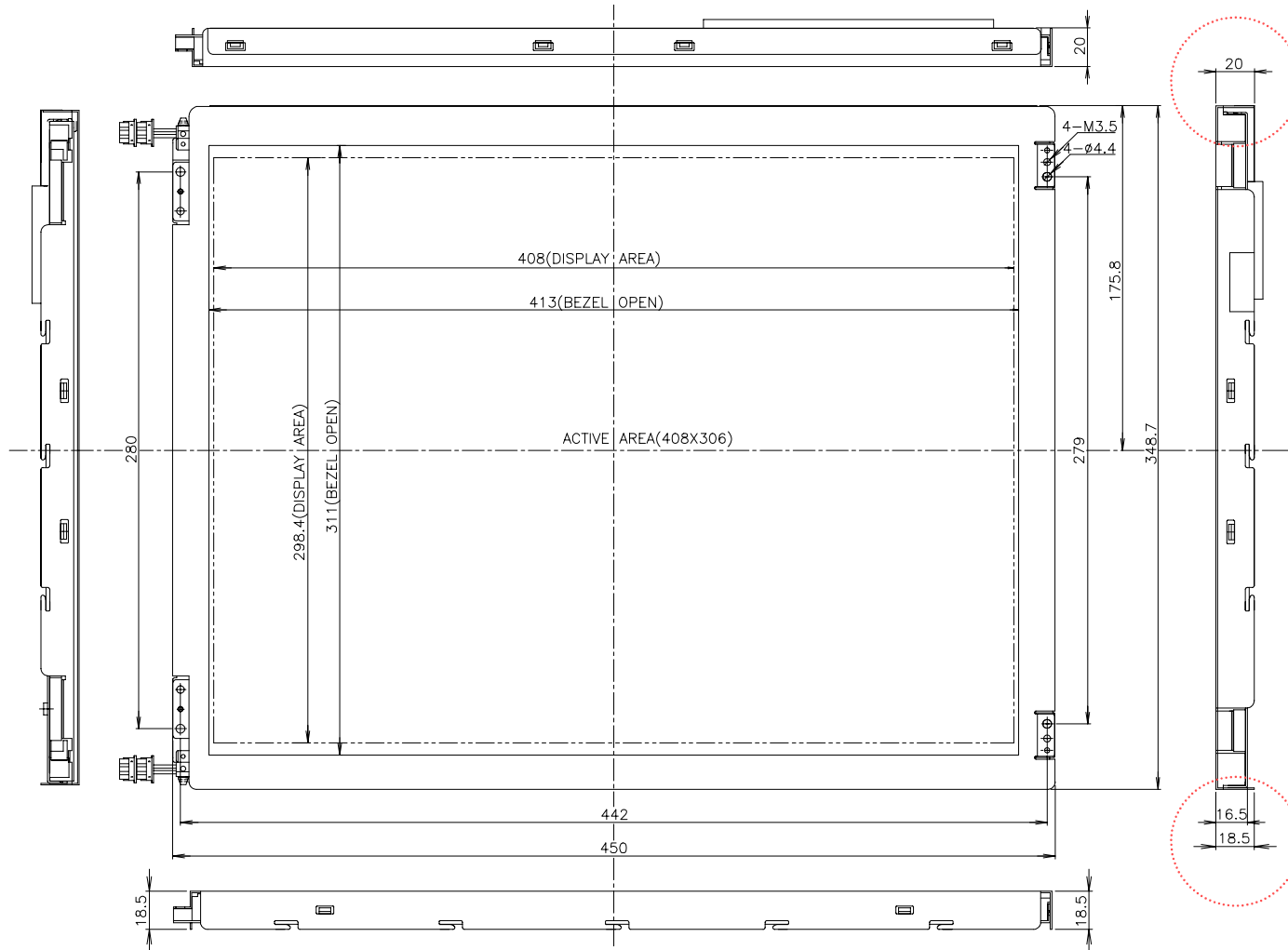
Horizontal	408.0 [mm]
Vertical	306.0 [mm]

Display Area :

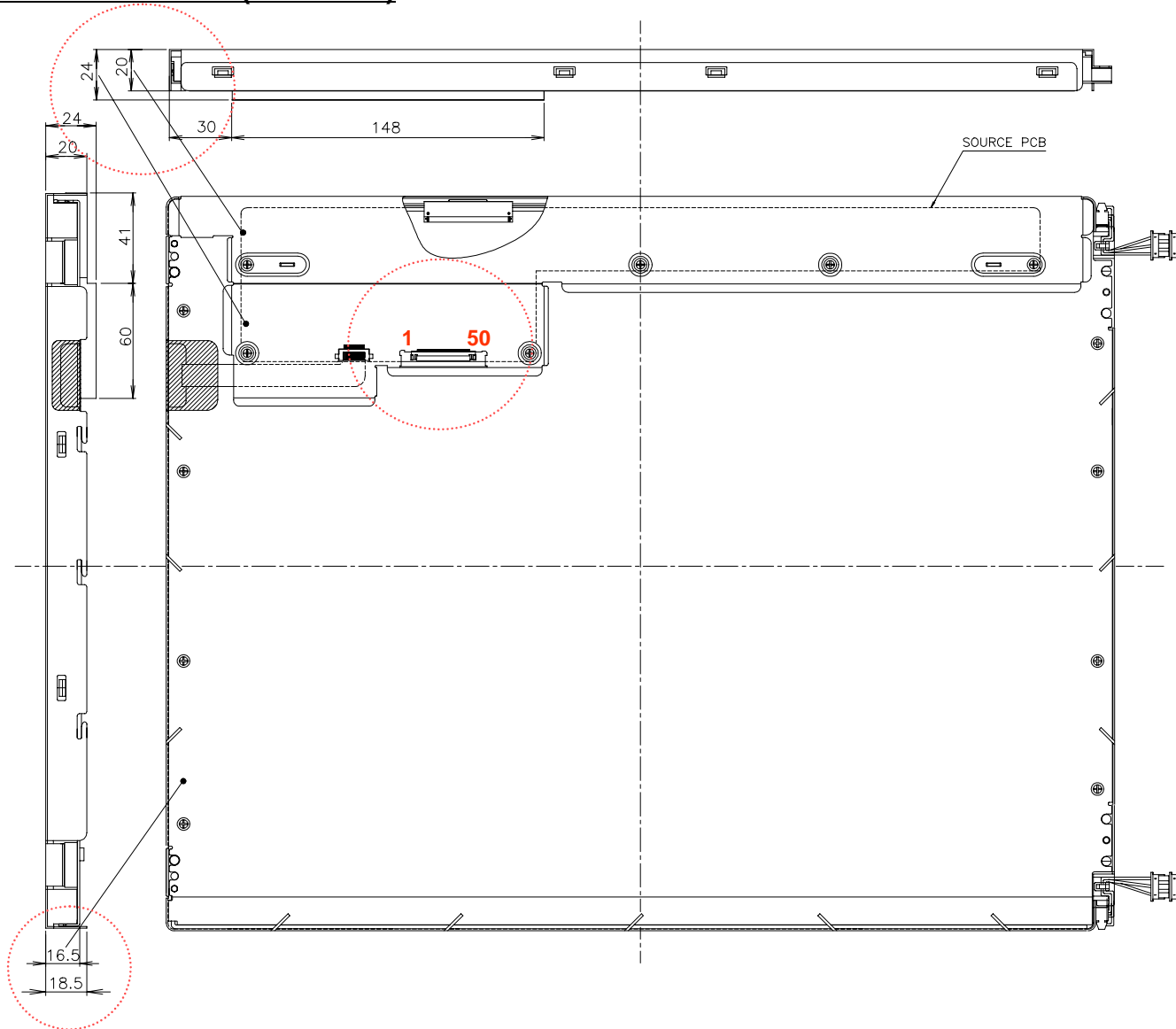
Horizontal	408.0 [mm]	
Vertical	298.4 [mm]	* In case of 12 lines (6 lines at each side) hidden mode.

Weight (approximate)**(3,800) [g]**

Module Outline Dimension (Front View)



Module Outline Dimension (Rear View)

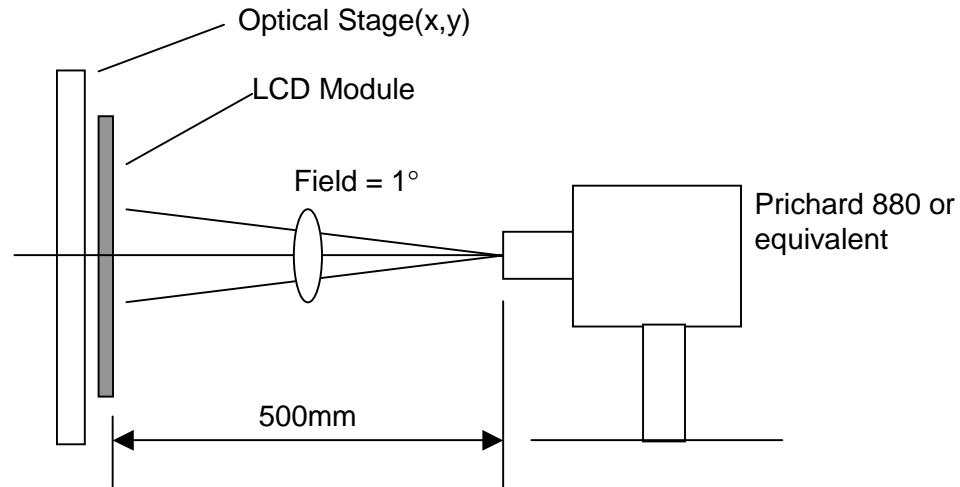


Reliability : Environmental Test Conditions

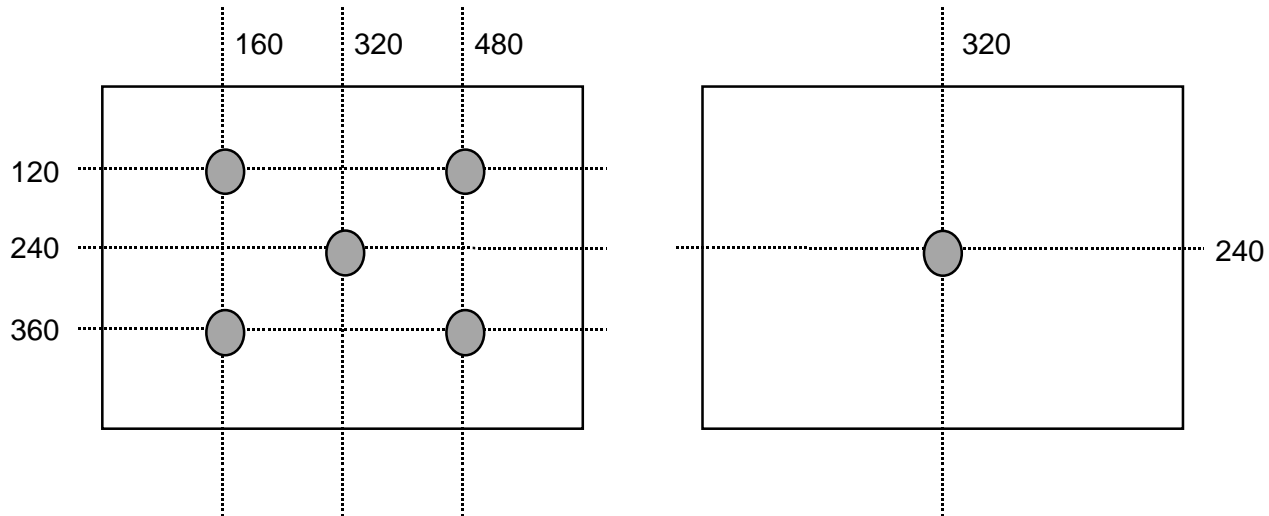
No	Test Item	Test Condition	Remark
1	High Temperature Storage Test	Ta = +60 . 50% RH 240 hrs	
2	Low Temperature Storage Test	Ta = -10 . 240 hrs	
3	High Temperature Operating Test	Ta = +50 . 80% RH 240 hrs	
4	Low Temperature Operating Test	Ta = 0 . 240 hrs	
5	Thermal Shock Test (Non-operating)	-20 . / 30 minutes, 60 . / 30 minutes, 50 cycle	
6	Altitude : Operating Storage / Shipment	12,000 ft 40,000 ft	
7	Vibration Test (Non-operating)	Waveform : Random Vibration level : 1.0 G RMS Bandwidth : 5 ~ 500Hz Duration : X, Y, Z, 10 min one time each direction	
8	Shock test (non-operating)	Shock level : 100G Waveform: half sine wave, 2ms Direction : ±X, ±Y, ±Z one time each direction	
9	ESD test (non-operating)	Condition : 150pF, 330Ω Terminal : 200V Chassis : 10kV	

•Result Evaluation Criteria : There should be no changes, which might affect the practical display function when the display quality test is conducted under normal operating condition.

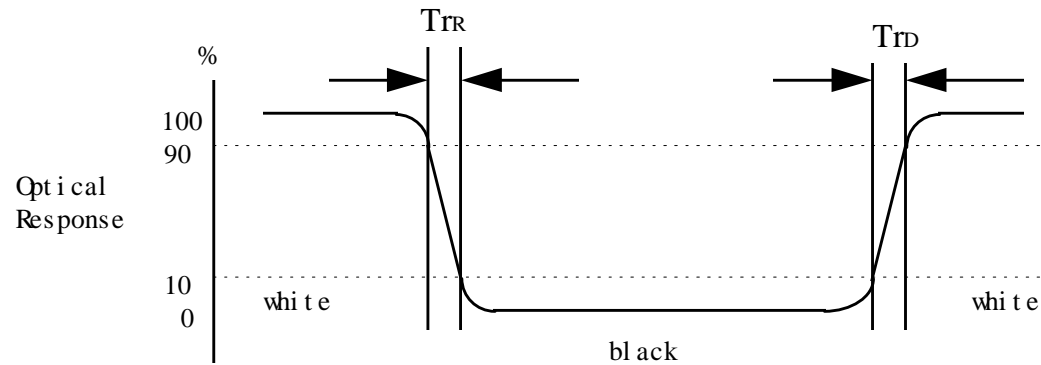
Optical Characteristic Measurement Equipment and Method



Luminance Measurement Point



Response Time Measuring Criteria



Viewing Angle Measuring Criteria

