

# Interface Specification

(For Engineering Sample)

**Issue Date : 00-01-06**

**Model : LTM213U3**

**Note :** This specification is available only for Engineering Samples.  
Without prior notice, all of data and terms would be changed or re-arranged.

**PREPARED BY : AMLCD Division LCD R&D Team 2**

**SAMSUNG ELECTRONICS CO., LTD.**

## GENERAL DESCRIPTION

### DESCRIPTION

LTM213U3 is a TFT-LCD monitor capable of displaying a very high resolution image, which can produce a 16.7M colors simultaneously . This product can receive LVDS input signal through JAE 31Pin connector and 5V Power through Molex 12 Pin connector respectively. It shows a high brightness screen as 200 cd/m<sup>2</sup> Min.

### FEATURES

#### (1) General Specifications

Screen size : 21.3" diagonal  
Active area dimension : 432.0(H) ; 324.0(V) [mm<sup>2</sup>]  
Resolution : UXGA(1600x1200xRGB)  
Pixel pitch : 0.270x0.270 [mm<sup>2</sup>]  
Pixel arrangement : vertical stripe  
No. of display color : 16.7M colors(8-bit per color)  
Power consumption : 60 [W] Max. ( including B/L & inverter )  
Outline dimension : 483.0(H)x373.2(V)x28.0(T) max.  
Weight : 5 Kg

#### (2) Electrical Specifications

Data format : 2ch OpenLDI(LVDS), 2Pixel/clock  
Sync Mode : DE Mode Only  
Operating supply voltage : 5V Only  
Connector : JAE FI-WE31P-HF(for Data and Sync)  
Molex 53261(for Power)

#### (3) Optical Specifications

Brightness : 200 cd/m<sup>2</sup>, Min.  
Contrast ratio : 200 Typ.  
Viewing angle : 160 ; Horizontal, 160 ; Vertical, typ.  
Crosstalk : under 5%  
Response time : 70 [ms] Max.

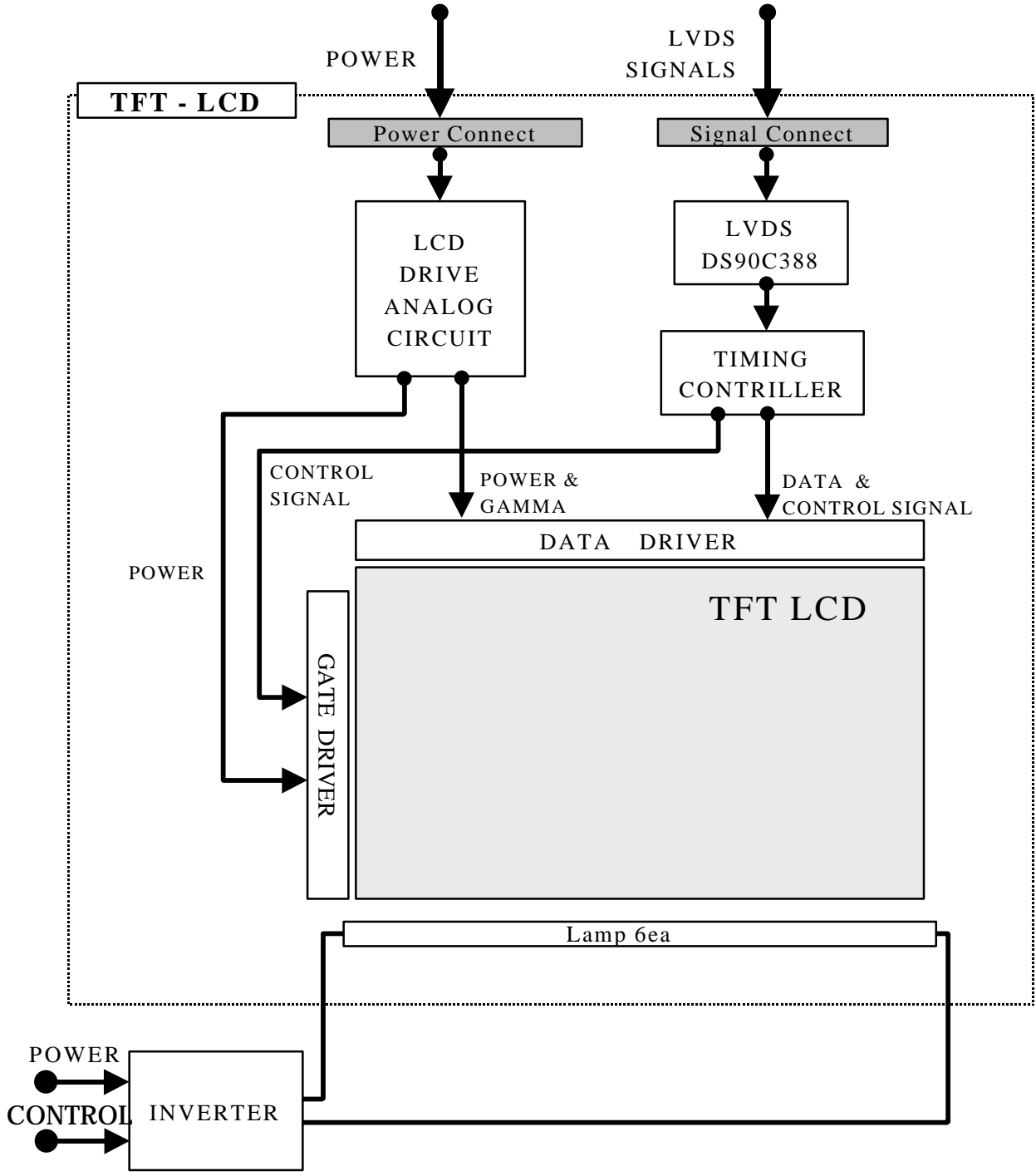
#### (4) Miscellaneous

MTBF : 20,000 hrs  
Edge light CCFL 6-lamps incorporated

### APPLICATIONS

Engineering workstation(EWS)  
high performance PC  
Desk Top Publishing system

# 1. Block Diagram



## 2.1. Module Signal Input Connect Pin Assignment

- Connector : JAE F1-WE31P-HF ( Matching Socket : JAE F1-WE31S-HF)

387 No.	Tx Signal	JAE31P No.	388 No.	Rx Signal	Remark
		31 (Reserved)		Reserved	
		30 (Reserved)		Reserved	
		29 (Reserved)		Reserved	
		28 (Reserved)		Reserved	
		27 (Reserved)		Reserved	
28	TxOut7+	26	79	RxOut7+	Twisted Pair
29	TxOut7-	25	80	RxOut7-	
		24 (GND)			Twisted Pair
		23 (GND)			
31	TxOut6+	22	82	RxOut6+	Twisted Pair
32	TxOut6-	21	83	RxOut6-	
33	TxOut5+	20	84	RxOut5+	Twisted Pair
34	TxOut5-	19	85	RxOut5-	
36	TxOut4+	18	86	RxOut4+	Twisted Pair
37	TxOut4-	17	87	RxOut4-	
		16 (GND)			Twisted Pair
		15 (GND)			
38	TxOut3+	14	89	RxOut3+	Twisted Pair
39	TxOut3-	13	90	RxOut3-	
41	TxOutCLK+	12	91	RxOutCLK+	Twisted Pair
42	TxOutCLK-	11	92	RxOutCLK-	
		10 (GND)			Twisted Pair
		9 (GND)			
44	TxOut2+	8	94	RxOut2+	Twisted Pair
45	TxOut2-	7	95	RxOut2-	
46	TxOut1+	6	96	RxOut1+	Twisted Pair
47	TxOut1-	5	97	RxOut1-	
49	TxOut0+	4	98	RxOut0+	Twisted Pair
50	TxOut0-	3	99	RxOut0-	
		2 (GND)			Twisted Pair
		1 (GND)			

### 2.1.1 Open LDI Interface( Data Mapping:387/388)

VGA-TFT Data Signals Color Bits		Transmitter input (pin NO.)	Receiver output (pin NO.)	TFT Panel Signals
	48 Bit	DS90C387	DS90C388	48 Bit
LSB	RO0	R10 (10)	R10 (8)	RO0
	RO1	R11 (9)	R11 (9)	RO1
	RO2	R12 (8)	R12 (10)	RO2
	RO3	R13 (7)	R13 (11)	RO3
	RO4	R14 (6)	R14 (12)	RO4
	RO5	R15 (5)	R15 (14)	RO5
	RO6	R16 (4)	R16 (15)	RO6
MSB	RO7	R17 (3)	R17 (17)	RO7
LSB	GO0	G10 (2)	G10 (18)	GO0
	GO1	G11 (1)	G11 (19)	GO1
	GO2	G12 (100)	G12 (20)	GO2
	GO3	G13 (99)	G13 (21)	GO3
	GO4	G14 (96)	G14 (22)	GO4
	GO5	G15 (95)	G15 (24)	GO5
	GO6	G16 (94)	G16 (26)	GO6
MSB	GO7	G17 (93)	G17 (27)	GO7
LSB	BO0	B10 (92)	B10 (28)	BO0
	BO1	B11 (91)	B11 (29)	BO1
	BO2	B12 (90)	B12 (30)	BO2
	BO3	B13 (89)	B13 (31)	BO3
	BO4	B14 (88)	B14 (32)	BO4
	BO5	B15 (87)	B15 (34)	BO5
	BO6	B16 (86)	B16 (36)	BO6
MSB	BO7	B17 (85)	B17 (37)	BO7
LSB	RE0	R20 (84)	R20 (38)	RE0
	RE1	R21 (81)	R21 (39)	RE1
	RE2	R22 (80)	R22 (40)	RE2
	RE3	R23 (79)	R23 (41)	RE3
	RE4	R24 (78)	R24 (43)	RE4
	RE5	R25 (77)	R25 (46)	RE5
	RE6	R26 (76)	R26 (47)	RE6
MSB	RE7	R27 (75)	R27 (48)	RE7

VGA-TFT Data Signals Color Bits		Transmitter input (pin NO.)	Receiver output (pin NO.)	TFT Panel Signals
	48 Bit	DS90C387	DS90C388	48 Bit
LSB	GE0	G20 (74)	G20 (49)	GE0
	GE1	G21 (73)	G21 (50)	GE1
	GE2	G22 (72)	G22 (51)	GE2
	GE3	G23 (71)	G23 (52)	GE3
	GE4	G24 (70)	G24 (53)	GE4
	GE5	G25 (69)	G25 (55)	GE5
	GE6	G26 (66)	G26 (57)	GE6
MSB	GE7	G27 (65)	G27 (58)	GE7
LSB	BE0	B20 (64)	B20 (59)	BE0
	BE1	B21 (63)	B21 (60)	BE1
	BE2	B22 (62)	B22 (61)	BE2
	BE3	B23 (61)	B23 (62)	BE3
	BE4	B24 (60)	B24 (64)	BE4
	BE5	B25 (59)	B25 (65)	BE5
	BE6	B26 (58)	B26 (67)	BE6
MSB	BE7	B27 (57)	B27 (68)	BE7

**\*NOTE: LTM213U3 input application data mapping (R\_FDE, DUAL:Vcc, R\_FB, BAL:GND)**

**LVDS 387 (Transmitter) Pin Assign**

1	Go1	21	R_FDE	41	CLK+	61	Be3	81	Re1
2	Go0	22	NPD	42	CLK-	62	Be2	82	Vcc
3	Ro7	23	DUAL	43	LGnd	63	Be1	83	Gnd
4	Ro6	24	BAL	44	Tx2+	64	Be0	84	Re0
5	Ro5	25	LGnd	45	Tx2-	65	Ge7	85	Bo7
6	Ro4	26	CK2+	46	Tx1+	66	Ge6	86	Bo6
7	Ro3	27	CK2-	47	Tx1-	67	Vcc	87	Bo5
8	Ro2	28	Tx7+	48	LVcc	68	Gnd	88	Bo4
9	Ro1	29	Tx7-	49	Tx0+	69	Ge5	89	Bo3
10	Ro0	30	LVcc	50	Tx0-	70	Ge4	90	Bo2
11	CLK	31	Tx6+	51	LGnd	71	Ge3	91	Bo1
12	PVcc	32	Tx6-	52	Gnd	72	Ge2	92	Bo0
13	Gnd	33	Tx5+	53	Vcc	73	Ge1	93	Go7
14	PRE	34	Tx5-	54	Hsync	74	Ge0	94	Go6
15	PSEL	35	LGnd	55	Vsync	75	Re7	95	Go5
16	PGnd	36	Tx4+	56	DE	76	Re6	96	Go4
17	PGnd	37	Tx4-	57	Be7	77	Re5	97	Vcc
18	PVcc	38	Tx3+	58	Be6	78	Re4	98	Gnd
19	PGnd	39	Tx3-	59	Be5	79	Re3	99	Go3
20	R_FB	40	LVcc	60	Be4	80	Re2	100	Go2

**LVDS 388 (Receiver) Pin Assign**

1	PGnd	21	Go3	41	Re3	61	Be2	81	LVcc
2	PVcc	22	Go4	42	CLK	62	Be3	82	Rx6+
3	PGnd	23	Vcc	43	Re4	63	Gnd	83	Rx6-
4	Deskew	24	Go5	44	Gnd	64	Be4	84	Rx5+
5	PSEL	25	Gnd	45	Vcc	65	Be5	85	Rx5-
6	BAL	26	Go6	46	Re5	66	Vcc	86	Rx4+
7	Gnd	27	Go7	47	Re6	67	Be6	87	Rx4-
8	Ro0	28	Bo0	48	Re7	68	Be7	88	LGnd
9	Ro1	29	Bo1	49	Ge0	69	De	89	Rx3+
10	Ro2	30	Bo2	50	Ge1	70	Vsync	90	Rx3-
11	Ro3	31	Bo3	51	Ge2	71	Hsync	91	CLK+
12	Ro4	32	Bo4	52	Ge3	72	Gnd	92	CLK-
13	Vcc	33	Vcc	53	Ge4	73	NC	93	LVcc
14	Ro5	34	Bo5	54	Gnd	74	NC	94	Rx2+
15	Ro6	35	Gnd	55	Ge5	75	NC	95	Rx2-
16	Gnd	36	Bo6	56	Vcc	76	LGnd	96	Rx1+
17	Ro7	37	Bo7	57	Ge6	77	R_FDE	97	Rx1-
18	Go0	38	Re0	58	Ge7	78	NPD	98	Rx0+
19	Go1	39	Re1	59	Be0	79	Rx7+	99	Rx0-
20	Go2	40	Re2	60	Be1	80	Rx7-	100	LGnd

JAE 31P  
Con.

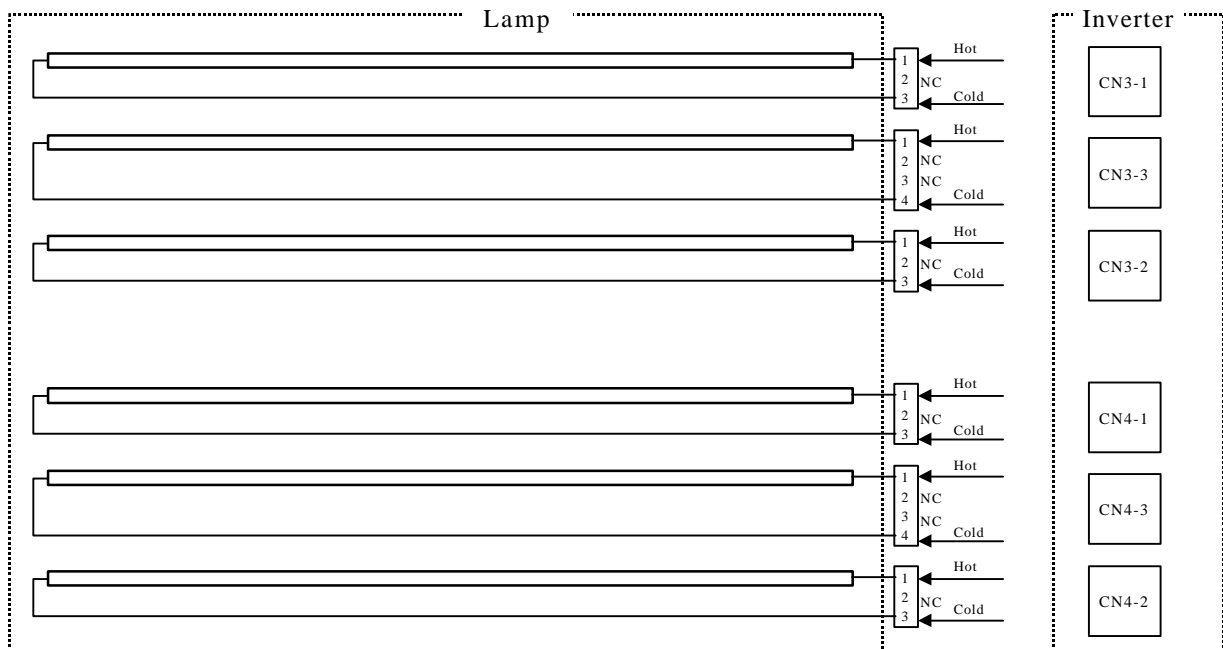
## 2.2. Module Power Input Connect Pin Assignment

- Power Input (+5.0 V)
- Connector : MOLEX 53261-1290 (Matching Socket : MOLEX 51021-1200 )

Pin No	Symbol	Function
1	+5V	Power Supply +5V
2		
3		
4		
5		
6		
7	GND	Power Ground
8		
9		
10		
11		
12		

## 2.3. Lamp Input Connect Pin Assignment

- Engineering Only



### 3. Absolute Maximum Rating

#### 3.1 Voltage/Current Absolute Rating

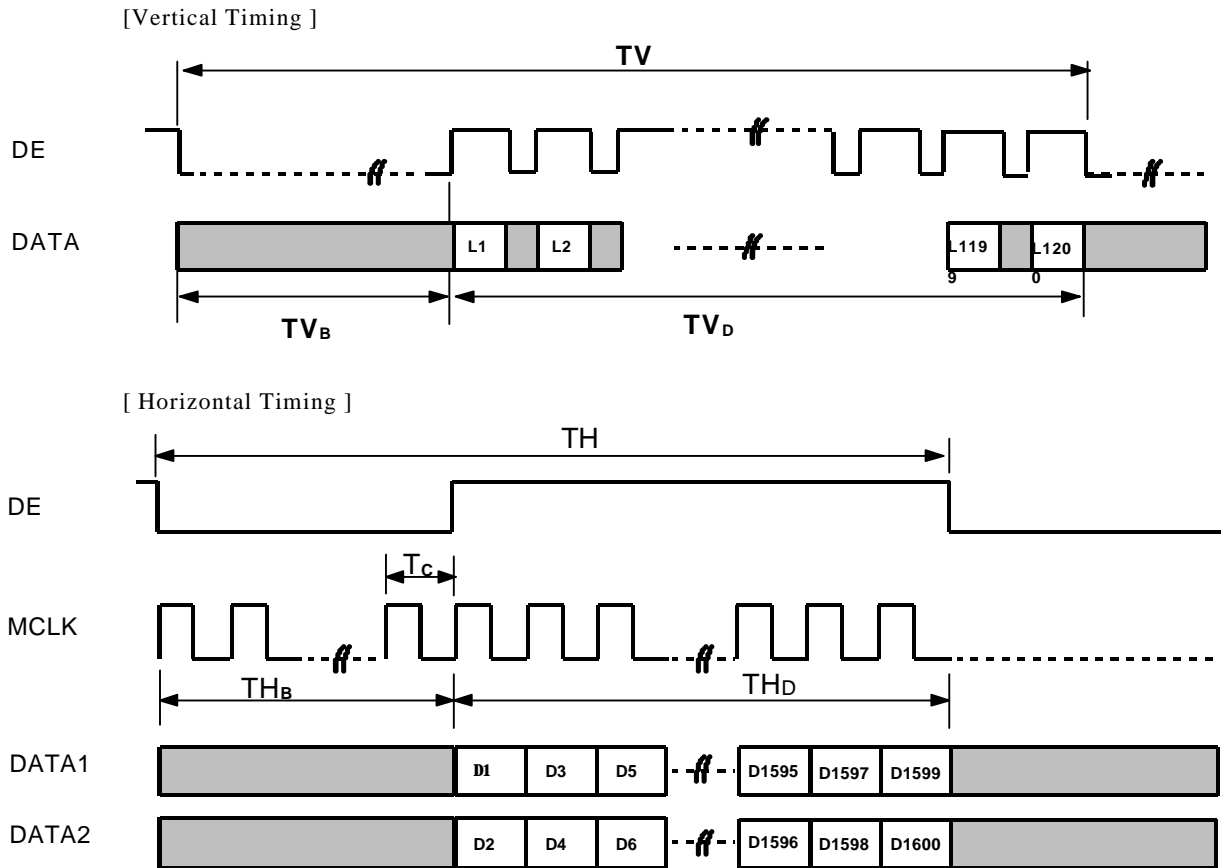
		Min	Typ	Max	
Module 5V	Voltage	4.5V	5.0V	5.5V	
	Power	1A Black	2A Mosaic	2.5A White	Vdd=5.0V
B/L 12V	Voltage	10.8V	12.0V	13.2V	
	Power	3.5A	4A	4.5A	Vbl=12.0V

#### 3.2 Lamp Voltage Absolute Rating

- TBD



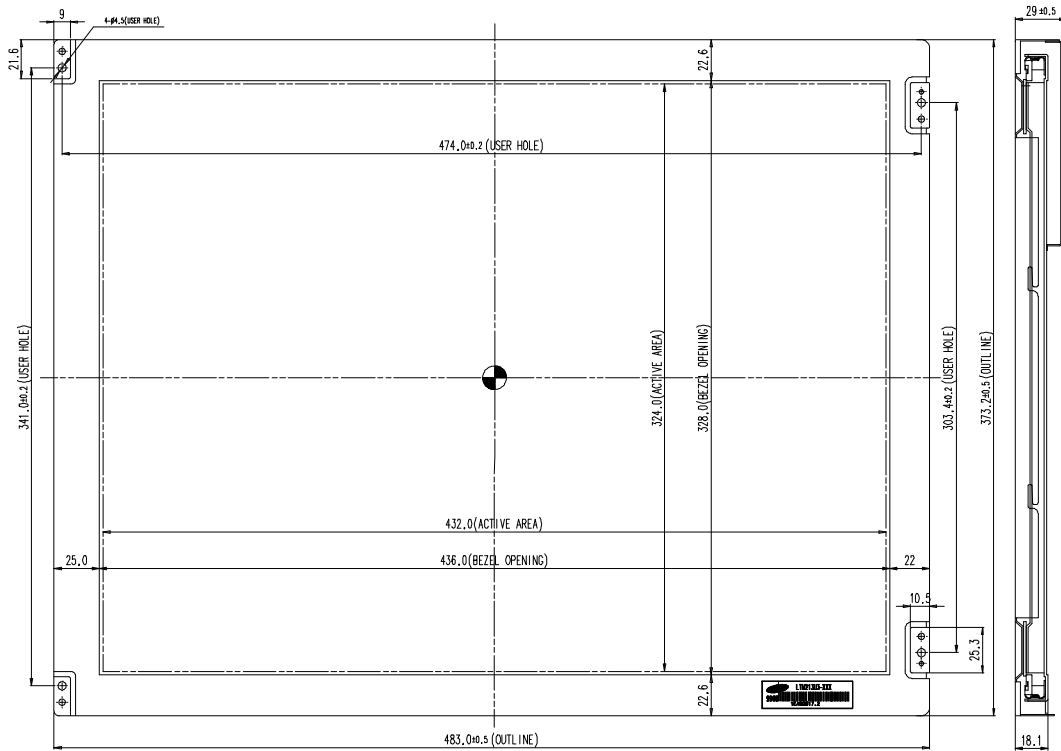
#### 4. Timing Diagram (DE Mode)



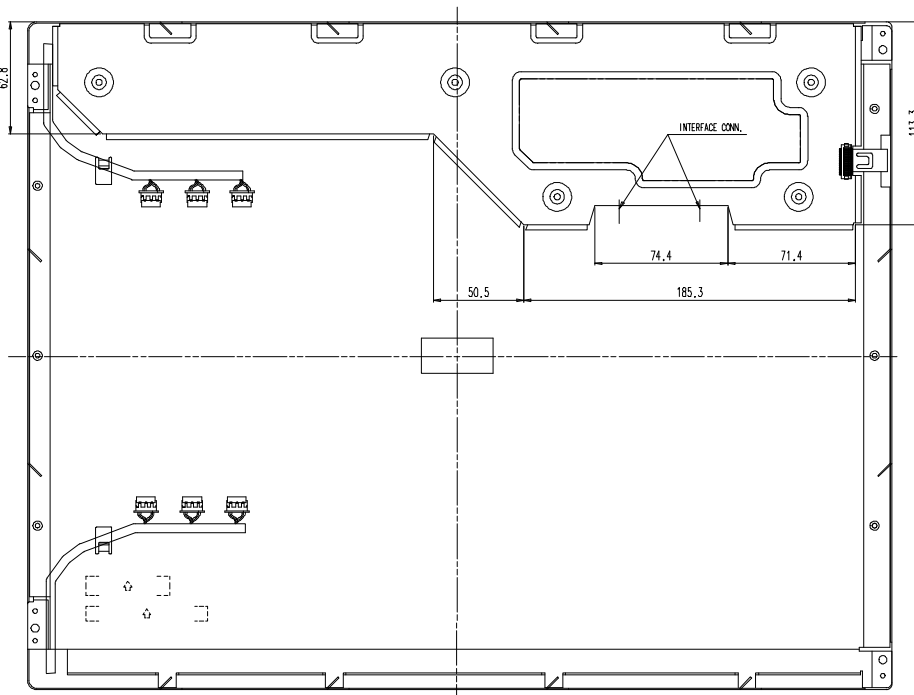
TIMING TABLE						
NAME		Symbol	Min. (REDUCED BLANKING)	Typ. (VESA STANDARD)	MAX	Unit
CLOCK FREQUENCY		$1/T_C$	62	81	90	MHz
HORIZONTAL	TOTAL TIME	TH	860	1080		Clock
	Active DATA	TH <sub>D</sub>	-	800	-	Clock
	BLANKING	TH <sub>B</sub>	60	280		Clock
VERTICAL	TOTAL TIME	TV	1205	1250		Line
	Active DATA	TV <sub>D</sub>	-	1200	-	Line
	BLANKING	TV <sub>B</sub>	5	50		Line

## 5. Outline Dimension

### 5.1 Front View



### 5.2 Rear View



### #. Inverter Power Input Connect Pin Assignment

- Power Input (CN1, +12.0 V)
- Connector : MOLEX 53261-0690 ( Matching Socket : MOLEX 51021-0600 )

Pin No	Symbol	Function
1	+12V	Power Supply +12V
2		
3		
4		
5		
6		

### ##. Inverter Signal Input Connect Pin Assignment

- Connector : MOLEX 53261-1290 (Matching Socket : MOLEX 51021-1200 )

Pin No	Symbol	Function
1	GND	Power Ground
2	BRT Control	B/L Brightness Control 0V: Max 5V:Min
3	GND	Power Ground
4	On/Off	CCFL Driver Signal ( <b>Active High</b> )
5	GND	Power Ground
6	GND	Power Ground
7	+5V	Logic Power 5V
8	GND	Power Ground
9	GND	Power Ground
10	NC	No Connection
11	NC	No Connection
12	NC	No Connection