

All information is subject to change without notice. Please read bottom notes.

FEATURES: (1) 10.4" VGA color display with High Brightness (800cd/m²).
 (2) Wide viewing angle and wide operating temperature.
 (3) LED Backlight(70,000hours MTBF@800cd/m², 25degree) w/o driving circuit

TENTATIVE

MECHANICAL SPECIFICATIONS

Item	Specifications
Dimensional Outline (Typ.)	238.5 (W) x 177.5 (H) x 11.5typ (D) mm
Number of Pixels	640 (W) x 480 (H) pixels
Active Area	211.2 (W) x 158.4 (H) mm
Pixel Pitch	0.33 (W) x 0.33 (H)
Weight (approximately)	620 g
Backlight	Sidelight (LEDs)

ABSOLUTE MAXIMUM RATINGS

Item		Min.	Max.	Unit
Supply Voltage	(V _{DD})	-0.3	4.0	V
	(V _{LED})	0	30.6	V
Input Signal Voltage		-0.3	V _{DD} +0.3	V
Operating Temperature(1) *1		-30	80	°C
Operating Temperature(2) *1		-40	85	°C
Storage Temperature		-45	90	°C
Operating Humidity		10	90	%RH
Storage Humidity		10	90	%RH

*1: In the condition from -30 to +80deg.C, display must keep functionality and readability. As for optical performance, it is measured under 25deg.C condition. About the range of "-40 to -30deg.C" and "+80 to +85deg.C", it does not need to keep functionality. However, after return to the condition of "-30 to +80deg.C", display needs to recover its functionality and readability. In case of place at high humidity over 80deg.C long term, its polarize function will be reduced and low contrast will be observed.

ELECTRICAL SPECIFICATION (Ta=25°C) (RECOMMENDED OPERATION CONDITION)

Item		Min.	Typ.	Max.	Unit	Remarks
Supply Voltage	(V _{DD})	3.0	3.3	3.6	V	
	(V _{LED})	---	25.6	30.4	V	
Differential Input Voltage	(V _{ID})	0.25	---	0.45	V	
Common Mode Input Voltage	(V _{CM})	1.0	---	2.0	V	
Current Consumption	(I _{DD}) *1	---	200	300	mA	
	(I _{LED})	---	75	120	mA	PWM=100%
Power Consumption *1		---	6.4	---	W	PWM=100%

*1 : 8 color bars pattern

OPTICAL SPECIFICATION (Ta=25°C)

Item		Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio	(CR)	250	400	---	---	
Viewing Angle (CR ≥ 10)	Top/Bottom	---	55/65	---	°	
	Left/Right	---	70/70	---	°	
Response Time	(t _{ON})	---	11	22	ms	
	(t _{OFF})	---	22	44	ms	
Luminance	(L)	625	800	---	cd/m ²	PWM=100%
Lamp Life Time (MTBF) *2, *3			70,000		h	PWM=100%

*2 : Conditions ; Ta=25°C, continuous lighting

*3 : Definitions of failure ; 1) Lcd luminance becomes half of the minimum value. 2) LED doesn't light normally.

*The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by Toshiba Mobile Display Co., Ltd or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Toshiba Mobile Display Co., Ltd or others.

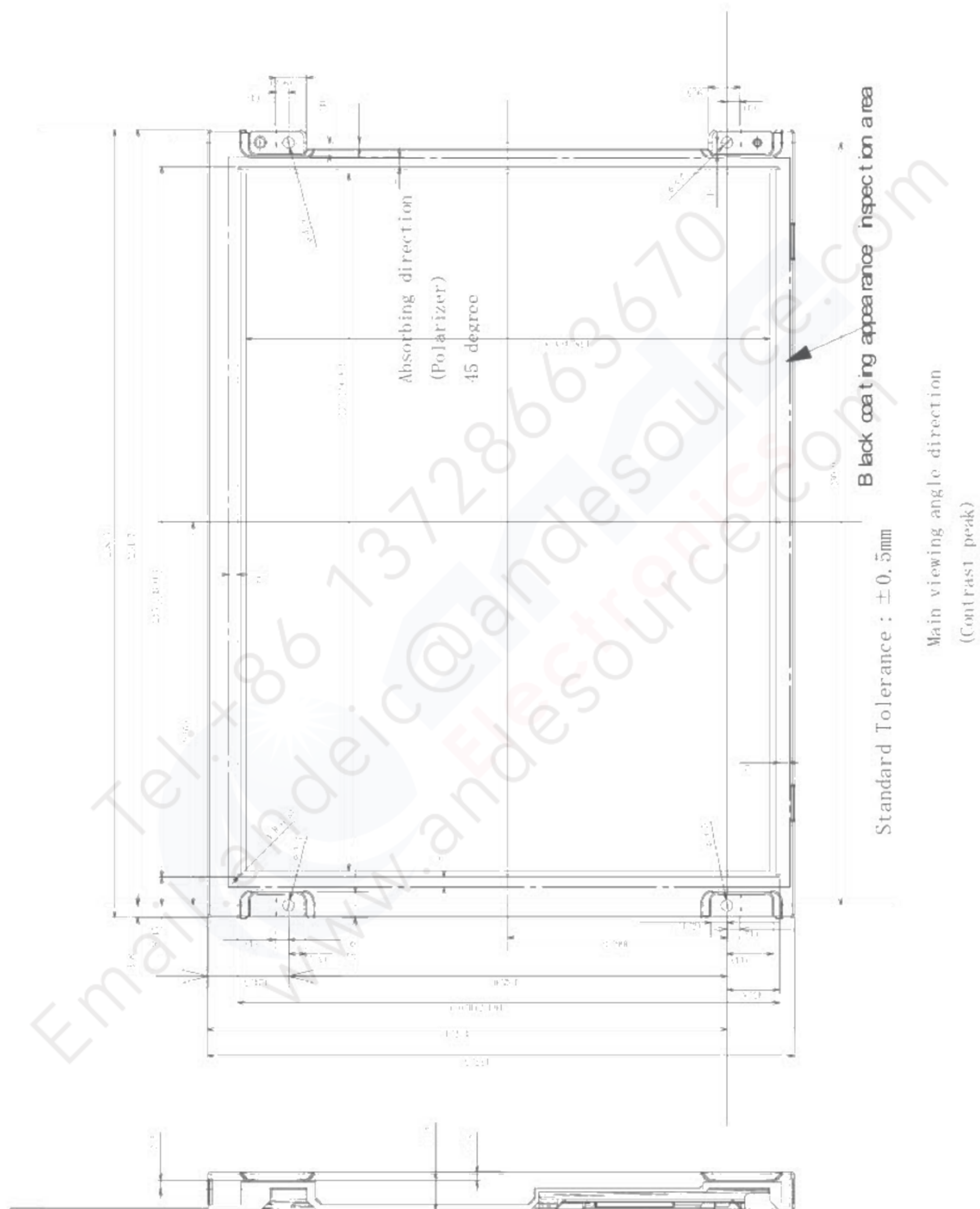
*The information contained herein may be changed without prior notice. It is therefore advisable to contact Toshiba Mobile Display Co., Ltd before proceeding with the design of equipment incorporating this product.

DIMENSIONAL OUTLINE

<Front>

TENTATIVE

Unit : mm

Standard tolerance : ± 0.5 

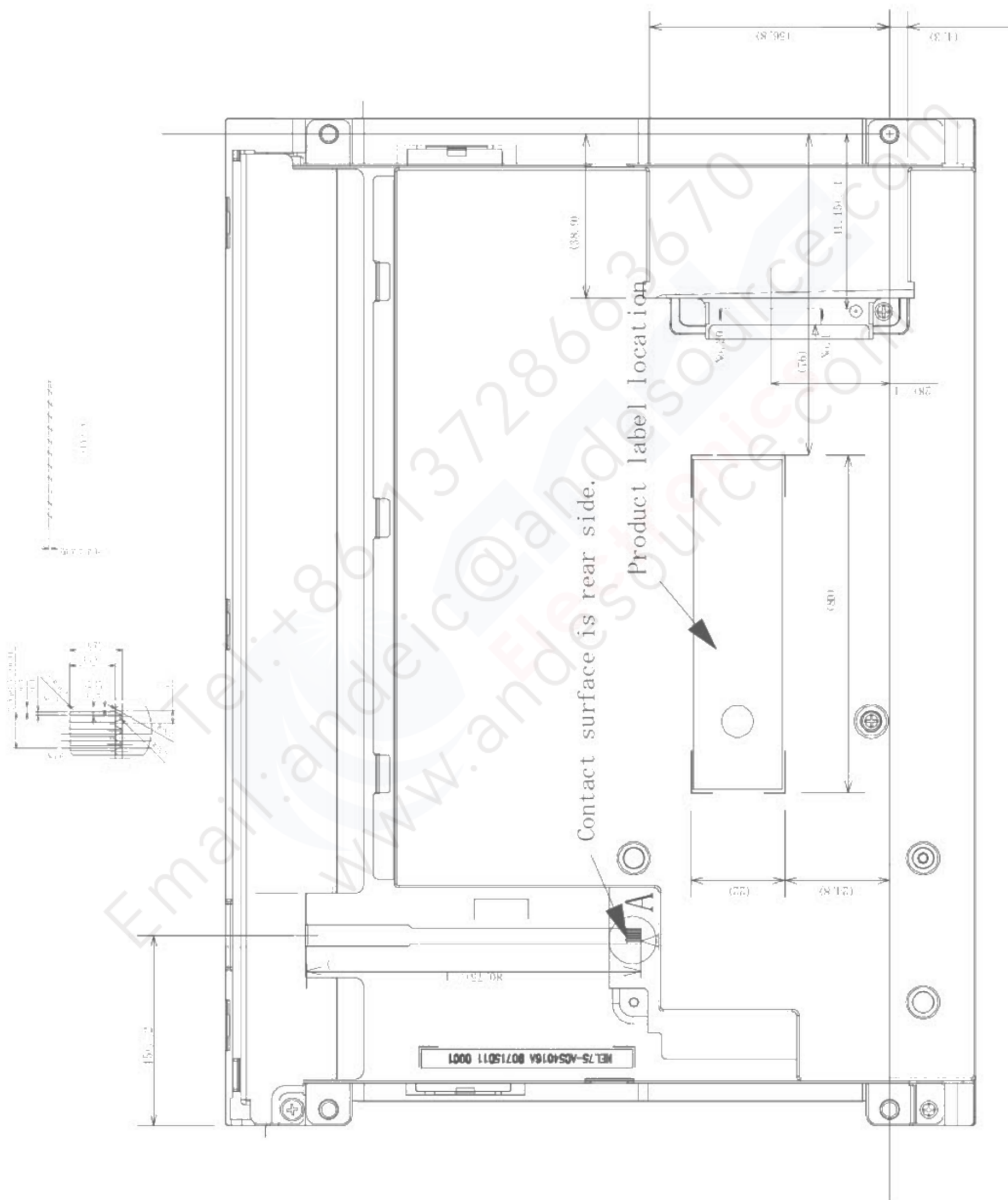
DIMENSIONAL OUTLINE

<Rear>

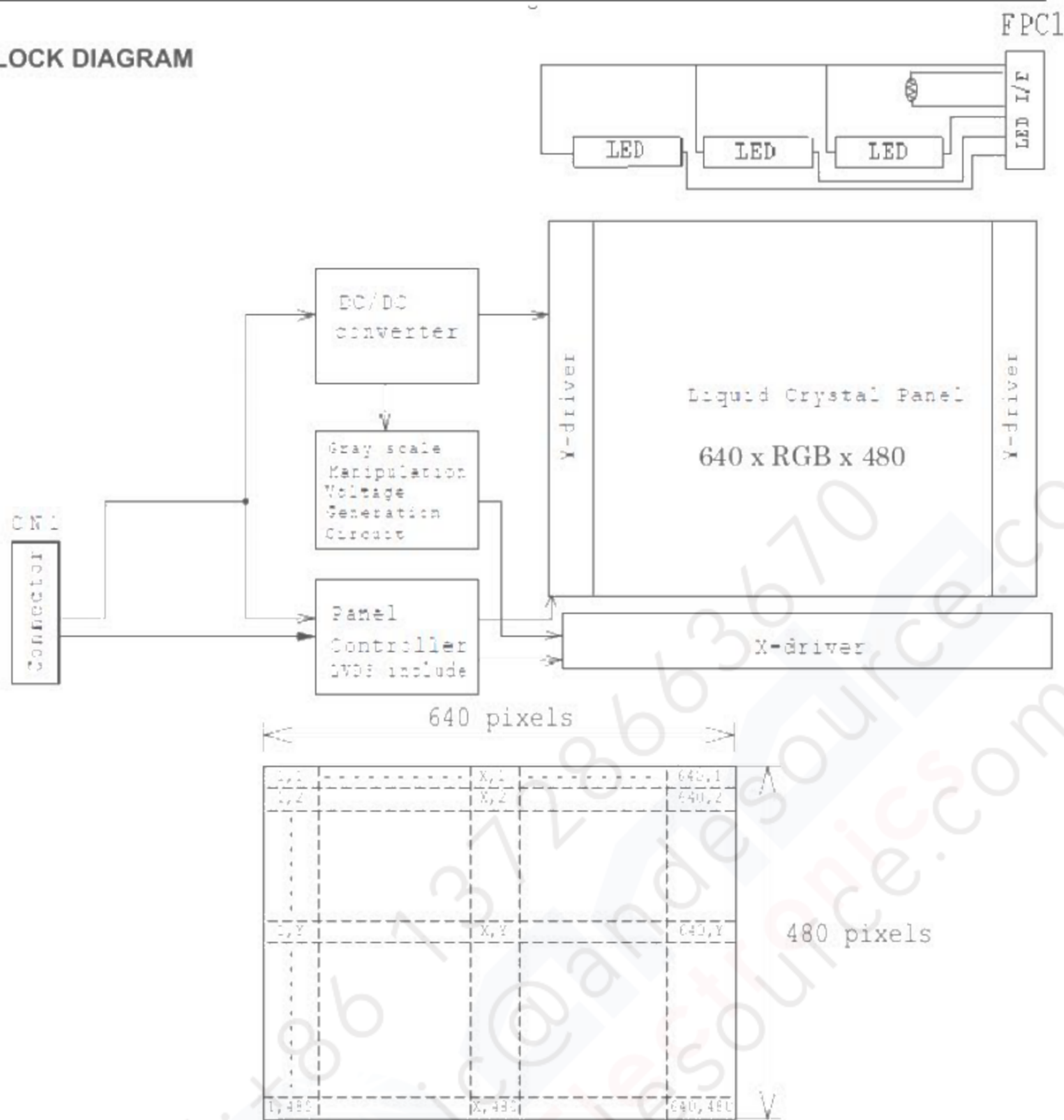
TENTATIVE

Unit : mm

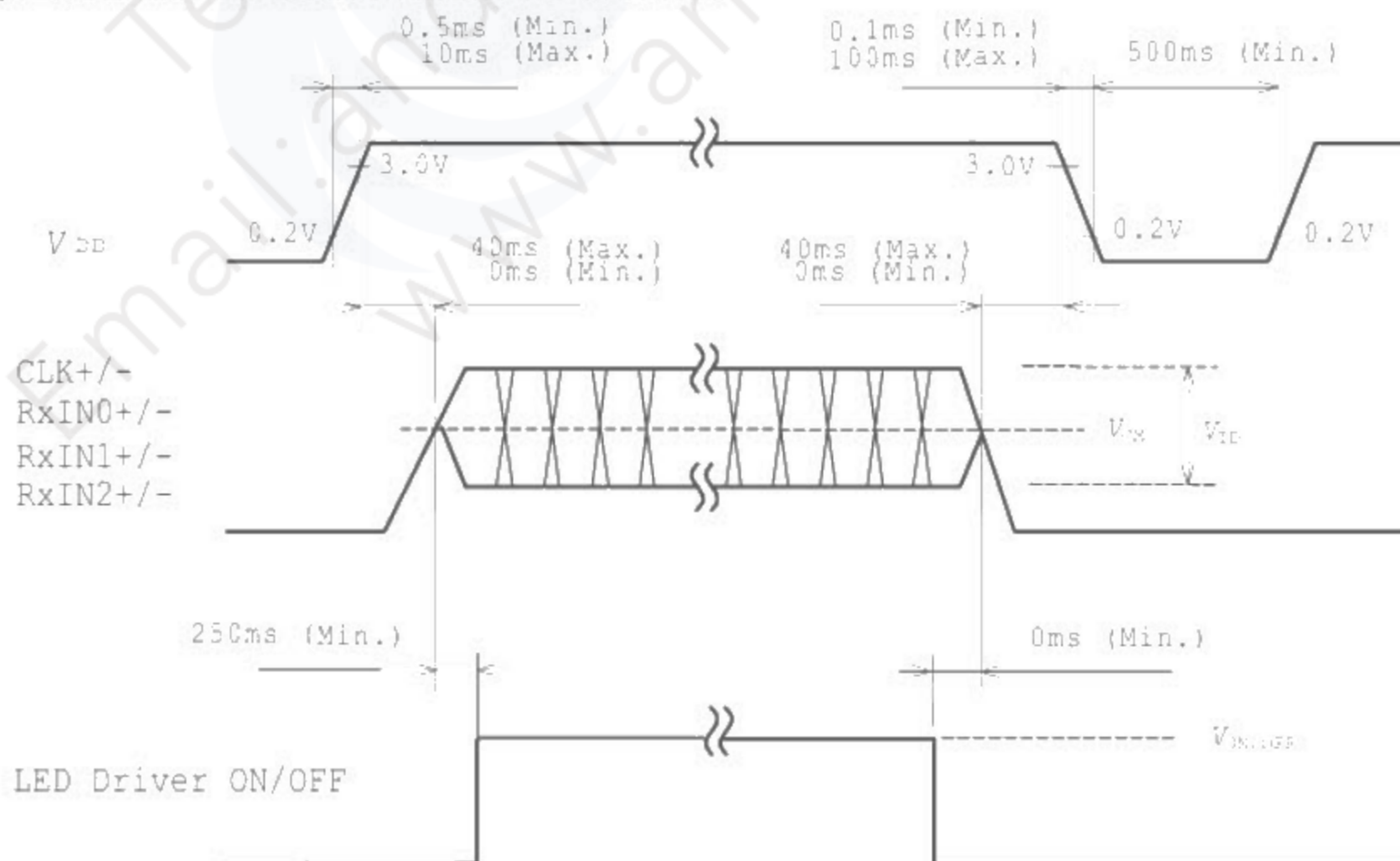
Standard tolerance : ± 0.5



BLOCK DIAGRAM



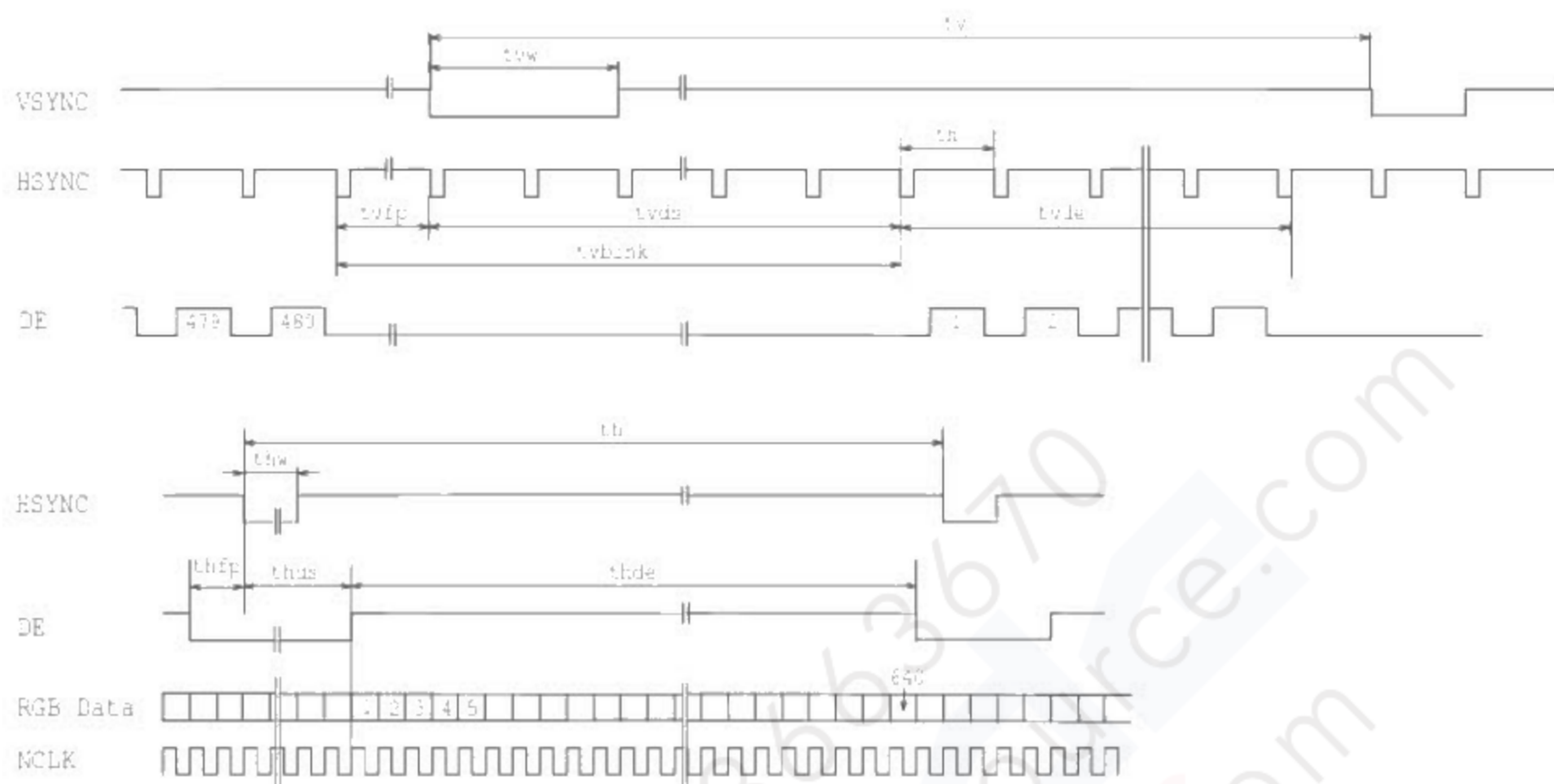
SEQUENCE OF POWER SUPPLIES AND SIGNALS



Note 1) When turn V_{DD} on and turn it off, the form of voltage should be input with no ripple signal.

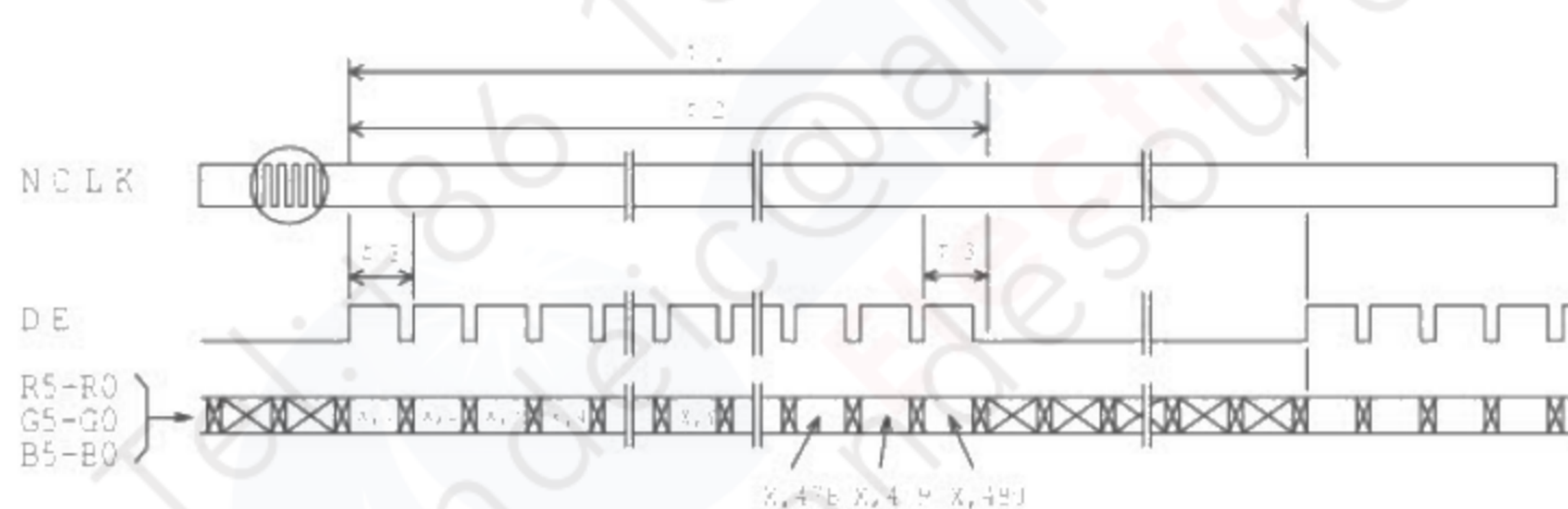
TIMING CHART

<H-Sync/V-Sync+DE Mode>

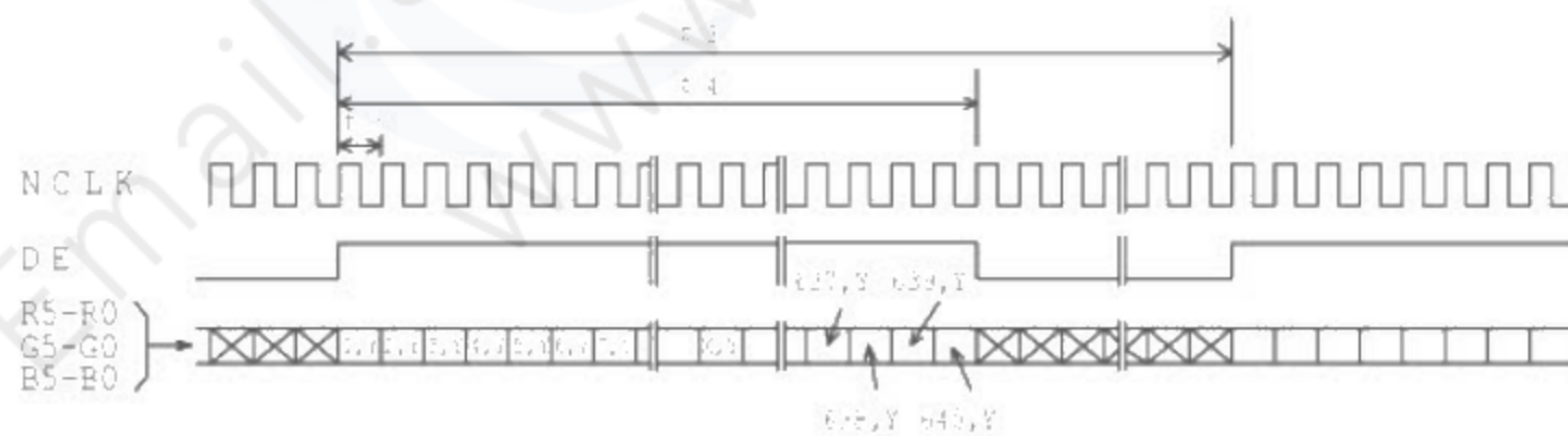


<DE-Only Mode>

Vertical Timing



Horizontal timing



TIMING SPECIFICATION ^{1) 2) 3) 4) 5) 6) 7)}

<H-Sync/V-Sync+DE Mode>

Item	Symbol	min.	typ.	Max.	unit
Frame Period	<i>tv</i>	500 ---	525 16.67	550 17.86	<i>th</i> ms
Vertical blanking Term	<i>tvbink</i>	20	45	120	<i>th</i>
V-sync Pulse Width	<i>tvw</i>	2	2	---	<i>th</i>
Vertical Front Porch	<i>tvfp</i>	2	10	---	<i>th</i>
Vertical Data Sync Period	<i>tvds</i>	18	35	---	<i>th</i>
Vertical Display Term	<i>tvde</i>	480	480	480	<i>th</i>
Horizontal Period	<i>th</i>	750 31.5	800 31.75	900 ---	<i>tc</i> us
H-sync Pulse Width	<i>thw</i>	8	96	---	<i>tc</i>
Horizontal Front Porch	<i>thfp</i>	8	16	---	<i>tc</i>
Horizontal Data Sync Period	<i>thds</i>	102	144	---	<i>tc</i>
Horizontal Display Term	<i>thde</i>	640	640	640	<i>tc</i>
Clock Period	<i>tc</i>	35.7	40	45.5	nS

<DE-Only Mode>

Item	Symbol	min.	typ.	Max.	unit
Frame Period	<i>t1</i>	500 x t3 ---	525 x t3 16.67	550 x t3 17.86	--- ms
Vertical Display Term	<i>t2</i>	480 x t3	480 x t3	480 x t3	---
One Line Scanning Term	<i>t3</i>	750 x t5 31.5	800 x t5 31.75	900 x t5 ---	--- us
Horizontal Display Term	<i>t4</i>	640 x t5	640 x t5	640 x t5	---
Clock Period	<i>t5</i>	35.7	40	45.5	nS

CONNECTOR PIN ASSIGNMENT FOR INTERFACE

CN1 INPUT SIGNAL ³⁾

Connector: 20268-020E-12F [1mm pitch, Gold plating] / I-PEX CO., LTD.

Mating connector: 20230-020B-F[SGC], 20230-T20-F[TWINCOAX], 20230-W20B-F[DISCRETE] / I-PEX CO., LTD.

DF19G-20S-1C(Plug), DF19A-2830SCFA(Crimp contact) / HIROSE ELECTRIC CO., LTD.

Terminal No.	Symbol	Function
1	VDD	Power Supply : +3.3V
2	VDD	Power Supply : +3.3V
3	GND ¹⁾	GND
4	GND ¹⁾	GND
5	RxIN0-	Negative LVDS differential data input (R0-R5, G0)
6	RxIN0+	Positive LVDS differential data input (R0-R5, G0)
7	GND ¹⁾	GND
8	RxIN1-	Negative LVDS differential data input (G1-G5, B0-B1)
9	RxIN1+	Positive LVDS differential data input (G1-G5, B0-B1)
10	GND ¹⁾	GND
11	RxIN2-	Negative LVDS differential data input (B2-B5, HS, VS, DE)
12	RxIN2+	Positive LVDS differential data input (B2-B5, HS, VS, DE)
13	GND ¹⁾	GND
14	CLK-	Clock Signal(-)
15	CLK+	Clock Signal(+)
16	NC ²⁾	
17	U/D	Vertical and Horizontal Reverse("L" level or Open : Normal, "H" level : Reverse)
18	L/R	Horizontal Reverse("L" level or Open : Normal, "H" level : Reverse)
19	NC ²⁾	
20	NC ²⁾	

Note 1) Please connect GND pin to ground. Don't use it as no-connect nor connection with high impedance.

Note 2) Please connect NC pin to nothing. Don't connect it to ground nor to other signal input.

Note 3) Do not send signals with Spread Spectrum.

FPC1 LED POWER SOURCE

FPC Terminal pitch : 0.5mm

Mating Connector : IMSA-9637S-06Y902 / IRISO Electronics Co., Ltd.

Terminal No.	Symbol	Function
1	VLED-A	LED Power Supply (Anode)
2	Th+	Thermistor + Note 1)
3	Th-	Thermistor - Note 1)
4	VLED-K1	LED Power Supply (Cathode 1)
5	VLED-K2	LED Power Supply (Cathode 2)
6	VLED-K3	LED Power Supply (Cathode 3)

Note 1) Thermistor Part Number : Panasonic's NTC Thermistor "ERTJ1VG103FA"

**RECOMMENDED TRANSMITTER (THC63LVDF63A, THC63LVDM63A by Thine Electronics, Inc.)
TO LT104AC54000 INTERFACE ASSIGNMENT**

Case1: 6bit Transmitter

THC63LVDF63A, THC63LVDM63A				LT104AC54000 Interface (CN1)	
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol	Terminal
Symbol	Terminal	Symbol	Function		Symbol
TA0	44	R0	Red Pixels Display Data (LSB)	TA- TA+	No.5 No.6
TA1	45	R1	Red Pixels Display Data		
TA2	47	R2	Red Pixels Display Data		
TA3	48	R3	Red Pixels Display Data		
TA4	1	R4	Red Pixels Display Data		
TA5	3	R5	Red Pixels Display Data (MSB)		
TA6	4	G0	Green Pixels Display Data (LSB)	TB- TB+	No.8 No.9
TB0	6	G1	Green Pixels Display Data		
TB1	7	G2	Green Pixels Display Data		
TB2	9	G3	Green Pixels Display Data		
TB3	10	G4	Green Pixels Display Data		
TB4	12	G5	Green Pixels Display Data (MSB)		
TB5	13	B0	Blue Pixels Display Data (LSB)	TC- TC+	No.11 No.12
TB6	15	B1	Blue Pixels Display Data		
TC0	16	B2	Blue Pixels Display Data		
TC1	18	B3	Blue Pixels Display Data		
TC2	19	B4	Blue Pixels Display Data		
TC3	20	B5	Blue Pixels Display Data (MSB)		
TC4	22	HSYNC	H-Sync	TCLK- TCLK+	No.14 No.15
TC5	23	VSYNC	V-Sync		
TC6	25	DE	Compound Synchronization Signal		
CLK IN	26	NCLK	Data Sampling Clock		

Note 1) Please connect NC pin to nothing. Don't connect it to ground nor to other signal input.

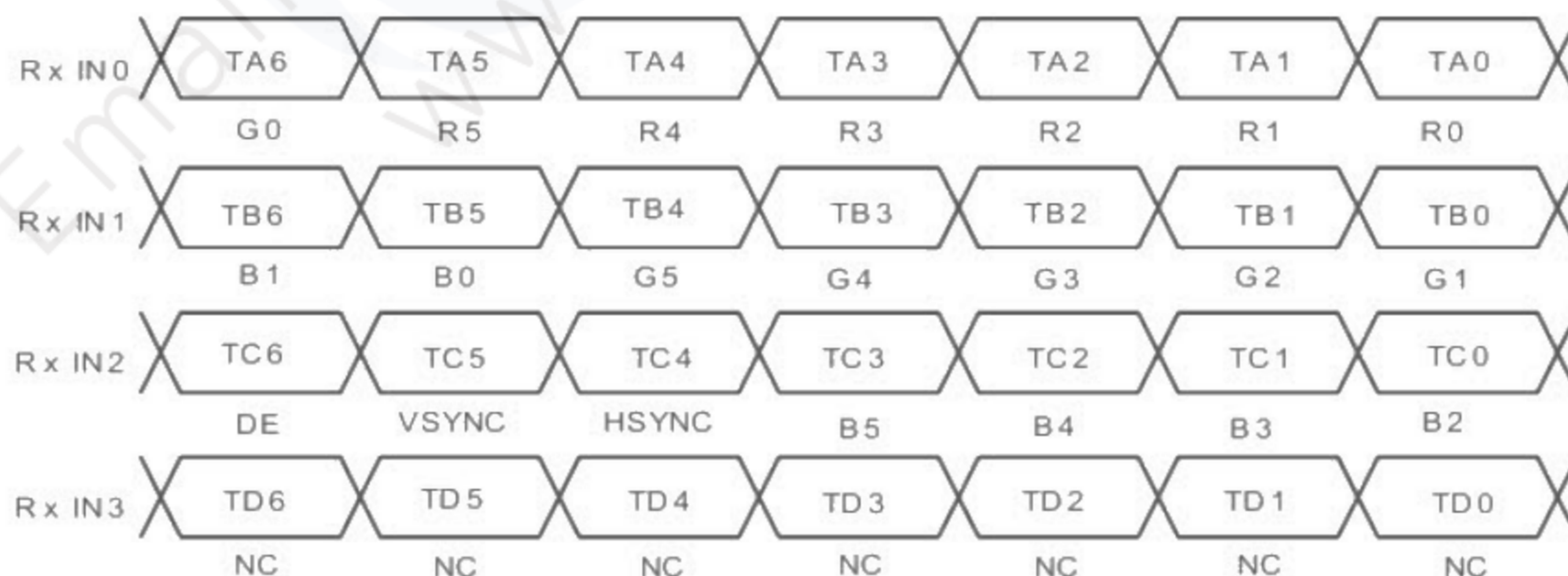


**RECOMMENDED TRANSMITTER (THC63LVDM83D, THC63LVDM83R by Thine Electronics, Inc.)
TO LT104AC54000 INTERFACE ASSIGNMENT**

Case2: 8bit Transmitter

THC63LVDM83D, THC63LVDM83R				LT104AC54000 Interface (CN1)	
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol	Terminal
Symbol	Terminal	Symbol	Function		Symbol
TA0	51	R0	Red Pixels Display Data (LSB)	TA- TA+	No.5 No.6
TA1	52	R1	Red Pixels Display Data		
TA2	54	R2	Red Pixels Display Data		
TA3	55	R3	Red Pixels Display Data		
TA4	56	R4	Red Pixels Display Data		
TA5	3	R5	Red Pixels Display Data (MSB)		
TA6	4	G0	Green Pixels Display Data (LSB)	TB- TB+	No.8 No.9
TB0	6	G1	Green Pixels Display Data		
TB1	7	G2	Green Pixels Display Data		
TB2	11	G3	Green Pixels Display Data		
TB3	12	G4	Green Pixels Display Data		
TB4	14	G5	Green Pixels Display Data (MSB)		
TB5	15	B0	Blue Pixels Display Data (LSB)	TC- TC+	No.11 No.12
TB6	19	B1	Blue Pixels Display Data		
TC0	20	B2	Blue Pixels Display Data		
TC1	22	B3	Blue Pixels Display Data		
TC2	23	B4	Blue Pixels Display Data		
TC3	24	B5	Blue Pixels Display Data (MSB)		
TC4	27	HSYNC	H-Sync	TD- TD+	
TC5	28	VSYSN	V-Sync		
TC6	30	DE	Compound Synchronization Signal		
TD0	50	NC ¹⁾	Non Connection (open)		
TD1	2	NC ¹⁾	Non Connection (open)		
TD2	8	NC ¹⁾	Non Connection (open)		
TD3	10	NC ¹⁾	Non Connection (open)	TCLK- TCLK+	No.14 No.15
TD4	16	NC ¹⁾	Non Connection (open)		
TD5	18	NC ¹⁾	Non Connection (open)		
TD6	25	NC ¹⁾	Non Connection (open)		
CLK IN	31	NCLK	Data Sampling Clock		

Note 1) Please connect NC pin to nothing. Don't connect it to ground nor to other signal input.



256k (k=1024) COLORS COMBINATION TABLE

	Display	R5 R4 R3 R2 R1 R0	G5 G4 G3 G2 G1 G0	B5 B4 B3 B2 B1 B0	Gray Scale Level
Basic Color	Black	L L L L L L	L L L L L L	L L L L L L	---
	Blue	L L L L L L	L L L L L L	H H H H H H	---
	Green	L L L L L L	H H H H H H	L L L L L L	---
	Light Blue	L L L L L L	H H H H H H	H H H H H H	---
	Red	H H H H H H	L L L L L L	L L L L L L	---
	Purple	H H H H H H	L L L L L L	H H H H H H	---
	Yellow	H H H H H H	H H H H H H	L L L L L L	---
	White	H H H H H H	H H H H H H	H H H H H H	---
Gray Scale of Red	Black	L L L L L L	L L L L L L	L L L L L L	L 0
	Dark ↑ ↓ Light	L L L L L H	L L L L L L	L L L L L L	L 1
		L L L L H L	L L L L L L	L L L L L L	L 2
		: : :	: : :	: : :	L3... L60
		H H H H L H	L L L L L L	L L L L L L	L61
		H H H H H L	L L L L L L	L L L L L L	L62
	Red	H H H H H H	L L L L L L	L L L L L L	Red L63
Gray Scale of Green	Black	L L L L L L	L L L L L L	L L L L L L	L 0
	Dark ↑ ↓ Light	L L L L L L	L L L L L H	L L L L L L	L 1
		L L L L L L	L L L L H L	L L L L L L	L 2
		: : :	: : :	: : :	L3... L60
		L L L L L L	H H H H L H	L L L L L L	L61
		L L L L L L	H H H H H L	L L L L L L	L62
	Green	L L L L L L	H H H H H H	L L L L L L	Green L63
Gray Scale of Blue	Black	L L L L L L	L L L L L L	L L L L L L	L 0
	Dark ↑ ↓ Light	L L L L L L	L L L L L L	L L L L L H	L 1
		L L L L L L	L L L L L L	L L L L H L	L 2
		: : :	: : :	: : :	L3... L60
		L L L L L L	L L L L L L	H H H H L H	L61
		L L L L L L	L L L L L L	H H H H H L	L62
	Blue	L L L L L L	L L L L L L	H H H H H H	Blue L63
Gray Scale of White & Black	Black	L L L L L L	L L L L L L	L L L L L L	L 0
	Dark ↑ ↓ Light	L L L L L H	L L L L L H	L L L L L H	L 1
		L L L L H L	L L L L H L	L L L L H L	L 2
		: : :	: : :	: : :	L3... L60
		H H H H L H	H H H H L H	H H H H L H	L61
		H H H H H L	H H H H H L	H H H H H L	L62
	White	H H H H H H	H H H H H H	H H H H H H	White L63



FOR SAFETY

LCD module is generally designed with precise parts to achieve light weighted thin mechanical dimensions.
In using our Modules, make certain that you fully understand and put into practice the warnings and safety precautions detailed in Engineering Information No.EE-N001,"CAUTIONS AND INSTRUCTIONS FOR TOSHIBA LCD MODULES".
Refer to individual specifications and TECHNICAL DATA sheets (hereinafter called "TD") for more detailed technical information.

1) SPECIAL PURPOSES

A) Toshiba Mobile Display Co., Ltd 's Standard LCD Modules have not been customized for operation in extreme environments or for use in applications where performance failures could be life-threatening or otherwise catastrophic.

B) Since Toshiba Mobile Display Co., Ltd 's Standard LCD Modules have not been designed for operation in extreme environments, they must never be used in devices that will be exposed to abnormally high levels of vibration or shock which exceed Toshiba Mobile Display Co., Ltd 's published specification limits.

C) In addition, since Toshiba Mobile Display Co., Ltd Standard LCD Modules have not been designed for use in applications where performance failures could be life-threatening or catastrophic, they must never be installed in aircraft navigation control systems (such as, but not limited to Traffic Collision Avoidance System and Air Traffic Indicator), in military defense or weapons systems, in critical industrial process-control systems (e.g., those involved in the production of nuclear energy), or in critical medical device or patient life-support systems.

2) DISASSEMBLING OR MODIFICATION

DO NOT DISASSEMBLE OR MODIFY the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display.

Toshiba Mobile Display Co., Ltd does not warrant the module, if customer disassembled or modified it.

3) BREAKAGE OF LCD PANEL

DO NOT INGEST liquid crystal material, DO NOT INHALE this material, and DO NOT CONTACT the material with skin, if LCD panel is broken and liquid crystal material spills out.

If liquid crystal material comes into mouth or eyes, rinse mouth or eyes out with water immediately.

If this material contact with skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

4) GLASS OF LCD PANEL

BE CAREFUL WITH CHIPS OF GLASS that may cause injuring fingers or skin, when the glass is broken.

5) ELECTRIC SHOCK

DISCONNECT POWER SUPPLY before handling LCD module.

DO NOT TOUCH the parts inside LCD module and the fluorescent lamp's connector or cables in order to prevent electric shock, because high voltage is supplied to these parts from the inverter unit while power supply is turned on.

6) ABSOLUTE MAXIMUM RATINGS AND POWER PROTECTION CIRCUIT

DO NOT EXCEED the absolute maximum rating values under the worst probable conditions caused by the supply voltage variation, input voltage variation, variation in parts' constants, environmental temperature, etc., otherwise LCD module may be damaged.

Employ protection circuit for power supply, whenever the specification or TD specifies it.

Suitable protection circuit should be applied for each system design.

7) RECOMMENDED OPERATION CONDITIONS

The performance and quality of the LCD panel are warranted only when the LCD panel is used within "the recommended operation conditions". Toshiba Mobile Display Co., Ltd. never warrants the performance and quality of the LCD panel when you use the LCD panel over "the recommended operation conditions", although within "the absolute maximum rating".

To use the LCD panel over "the recommended operation conditions" may have bad influence on the characteristics and reliability of the LCD panel and may shorten the life of the LCD panel.

Therefore, when designing the whole set, not to be over "the recommended operation conditions", you should fully take care of supply voltage change, characteristic of connection parts, surge of input-and-output line, and surrounding temperature.

8) DISPOSAL

When dispose LCD module, obey to the applicable environmental regulations.