5.1cm VE-Transmissive COLOUR TFT-LCD MODULE
(2.0 TYPE)

LTM020A52A
(a-Si TFT)

TENTATIVE

FEATURES

(1) a-Si TFT-LCD for Mobile Phone
(2) QVGA 240(H) x 320(V) pixels
(3) VE-Transmissive type Mode
(4) 262,144 colors (18 bit color depth)
(5) CPU memory bus I/F [9 or 16 bit] (i80)
(6) Cell + FPC + Backlight
(7) Driver IC --- uPD161704 (by NEC)

MECHANICAL SPECIFICATIONS

Item	Specifications
Dimensional Outline (TYP.)	37.2(*W*) x 52.1(*H*) x 1.9(*D*) mm(Typ.)
Number of Pixels	240(x RGB)(*W*) x 320 (*H*) pixels
Active Area	30.6 (*W*) x 40.8 (*H*) mm
Pixel Pitch	0.1275(*W*) x 0.1275(*H*)
Weight (approximately)	6.0g(Typ.)

ABSOLUTE MAXIMUM RATINGS

Item	Min.	Max.	Unit	Remarks
Power Supply for Logic	-0.3	4.0	V	
Power Supply for Analog	-0.3	4.0	V	
Operating Temperature	-20	70	°C	
Storage Temperature	-30	80	°C	
Storage Humidity (Max. wet bulb temp. = 39°C)	10	90	%(RH)	

ELECTRICAL SPECIFICATION

Item	Min.	Typ.	Max.	Unit	Remarks
Supply Voltage for Logic	2.55	2.60	2.65	V	*1
Supply Voltage for Analog	2.75	2.80	2.85	V	*1
Power Consumption	---	14	20	mW	*1 Normal mode

*1 : Final number well be specified with actual LCD samples

OPTICAL SPECIFICATION (*Ta*=25°C)

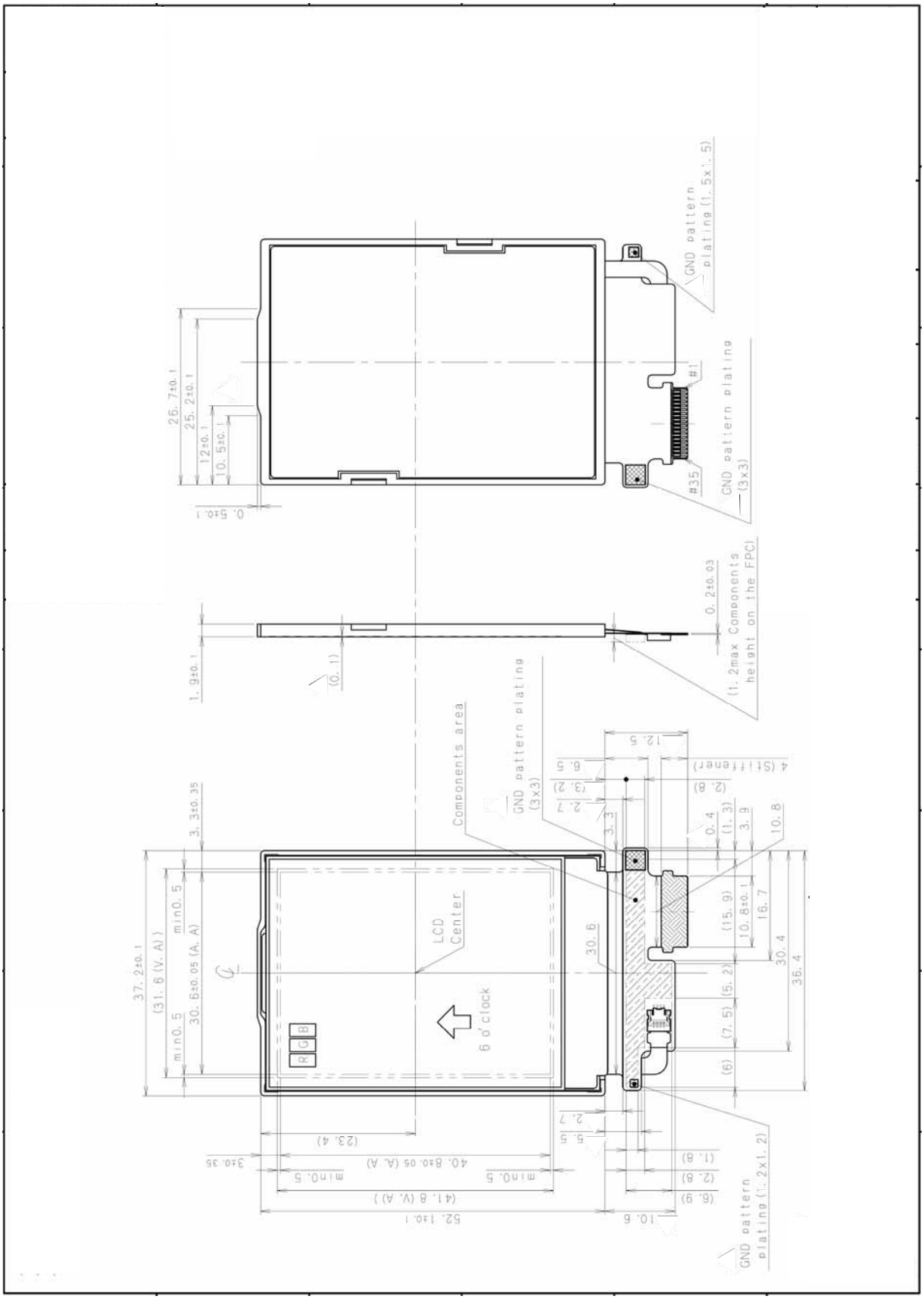
Item		Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio (*CR*)		240	400	---	---	*2 Transmissive mode
Response Time	(t_{ON})	---	25	40	ms	*2
	(t_{OFF})	---	25	40	ms	*2
Luminance*3		160	210	---	cd/m^2	*2 Transmissive mode
NTSC ratio		---	40	---	%	*2 Transmissive mode
Optimum view angle		---	6 o'clock *4	---	---	

*2 : Final number well be specified with actual LCD samples
*3 : LEDPower=20mA×3LED
*4 : Lower side of the panel has better viewing angle. (The optimum contrast direction is at 12 o'clock.)

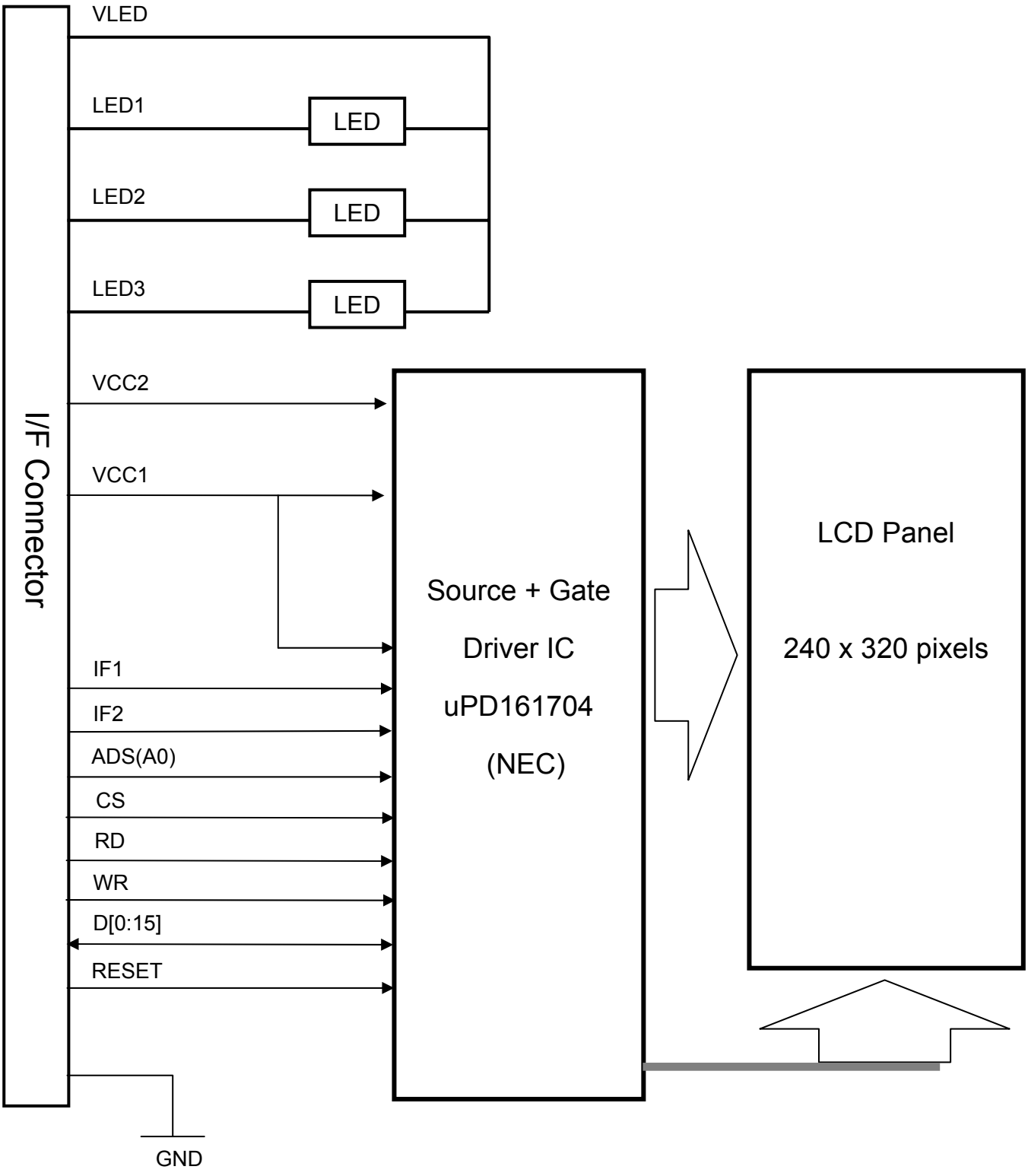
<Outline dimension>

Unit : mm

Standard tolerance : ±0.3



<Block diagram>



<Table of Pin Assignment>

I/F FPC

Pin No.	Symbol	I/O	Function
1	VLED	-	LED Anode
2	LED1	-	LED Cathode
3	LED2	-	LED Cathode
4	LED3	-	LED Cathode
5	Vcc2	-	Power Voltage for Analog (2.80 +/- 0.05 V)
6	Vcc1	-	Power Voltage for Logic (2.60 +/- 0.05 V)
7	ID	O	Vcc1
8	D15	I/O	LCD Data Bus
9	D14	I/O	LCD Data Bus
10	D13	I/O	LCD Data Bus
11	D12	I/O	LCD Data Bus
12	D11	I/O	LCD Data Bus
13	D10	I/O	LCD Data Bus
14	D9	I/O	LCD Data Bus
15	D8	I/O	LCD Data Bus
16	D7	I/O	LCD Data Bus
17	D6	I/O	LCD Data Bus
18	D5	I/O	LCD Data Bus
19	D4	I/O	LCD Data Bus
20	D3	I/O	LCD Data Bus
21	D2	I/O	LCD Data Bus
22	D1	I/O	LCD Data Bus
23	D0	I/O	LCD Data Bus
24	GND	-	GND
25	GND	-	GND
26	RD	I	Read
27	WR	I	Write
28	ADS(A0)	I	Resister Selection
29	CS	I	LCD Chip Selection
30	Vsync	O	Frame Synchronize Signal
31	IF2	I	Interface Mode Selection
32	IF1	I	Interface Mode Selection
33	RESET	I	LCD Reset
34	GND	-	GND
35	GND	-	GND

<Mating Connector>

XF2B-3545-31A(OMRON)

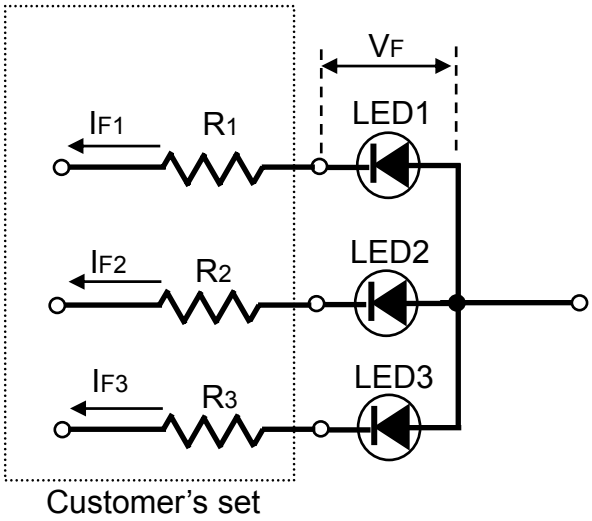
<Command/AC Timing>

Detail technical information of “command/data”, or “AC timing” can be available with following documents:

-IC specification of Source and Gate driver : uPD161704(NEC)

< Recommended LED circuit >

LED Products Name: NESW008BT
Maker : NICHIA
Luminous Intensity : U,T Rank
Color Rank : b5



V_F : Forward voltage of LED (In case of I_{F1}, I_{F2}, I_{F3}=20mA : V_F=3.75V)
I_{F1}, I_{F2}, I_{F3} : Forward current of LED
R_1, R_2, R_3 : Resistance for Limiting current

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 MATSUSHITA DISPLAY TECHNOLOGY CO.,LTD. LCD MODULES".
Refer to individual specifications and TECHNICAL DATA sheets (hereinafter called "TD") for more detailed technical information.

⚠ Warning

1) SPECIAL PURPOSES

a) Toshiba Matsushita Display Technology'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 they have not been designed for operation in extreme environments, they must never be used in devices that will be exposed to temperatures above 50 degrees Celsius or below 0 degrees Celsius, to X-ray or Gamma-ray radiation, or to abnormally high levels of vibration or shock which exceed Toshiba Matsushita Display Technology's specification limits.

c) In addition, since Toshiba Matsushita Display Technology's Standard LCD modules have not been designed for use in applications where performance failures could be life-threatening of 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.

⚠ Caution

1) DISASSEMBLING OR MODIFICATION

DO NOT DISASSEMBLE OR MODIFY the modules.
Sensitive parts inside LCD module may be damaged, and dusts or scratches may mar the displays. Toshiba Matsushita Display Technology does not warrant the modules, if customer disassembled or modified them.

2) BREAKAGE OF LCD PANEL

DO NOT INGEST liquid crystal material, DO NOT INHALE this material, and DO NOT PERMIT this material to contact the skin, if glass of LCD panel is broken. If liquid crystal material contacts the skin, mouth or clothing, take the following actions immediately. In case contact to the eye or mouth, rinse with large amount of running water for more than 15 minutes. In case contact to the skin or clothing, wipe it off immediately and wash with soap and large amount of running water for more than 15 minutes. The skin or closing may be damaged if liquid crystal material is left adhered. In case ingestion, rinse out the mouth well with water. After spewing up by drinking large amount of water, get medical treatment.

3) GLASS OF LCD PANEL

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

4) ABSOLUTE MAXIMUM RATINGS

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.

5) POWER PROTECTION CIRCUIT

Employ protection circuit for power supply, whenever the specification specifies it. A suitable protection circuit should be applied, based on each system design. A fuse is not fitted to this module. Therefore, without a suitable power-supply protection device, dust or partial circuit failure may cause overheating and/or burning , which may lead to injury.

6) DISPOSAL

Always comply with all applicable environmental regulations, when disposing of the LCD.

7) EDGES OF PARTS

Be careful with edges of glass parts, it may cause injuring.
For designing the system, give special consideration that the wiring and parts do not touch those edges.

<Revision History>

Date	Rev.	Page (New)	Item	Old	New	Reason