Product Information

ISSUE DATE : 02-04-01

MODEL : LTS500Q1-GF1

Note : This product information is subjet to change after 3 months of issue date.

PREPARED BY : AMLCD Technical Customer Service Team

Samsung Electronics Co . , LTD.

Contents

Revision History

Data	Rev. No.	Page	Summary
Apr. 01. 2002	000		Rev.000 was issued.

General Description

* Description

LTS500Q1-GF1 is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching devices. Customer can use the high quality display. This model is composed of a TFT-LCD Module(TFT-LCD panel, back-light system). The resolution of a 5.0" contains 320 x 240 pixels and can display Analog RGB colors.

* Features
- Thin and light weight
- High Luminance, high contrast ratio
- NTSC Analog Interface

* Applications
- Display terminal for AV Units(DVD, VTR)
- Portable LCD TV

* General Information

Items	Specification	Unit	Note
Display area	101.76(H) x 76.36(V) (5.0" Diagonal)	mm	
Driver element	a-Si TFT active matrix		
Display colors	Analog RGB	colors	
Number of pixels	320(H) x 240(V) (QVGA)	pixel	
Pixel arrangement	RGB vertical stripe		
Dot pitch	0.106(H) x 0.318(V)	mm	Dot
Display mode	Normally White		
Viewing Direction	6:00	o'clock	
Surface Treatment	Thin POL/ Haze 25		

* Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Size	Horizontal	12.9.9	130.4	130.9	mm	
	Vertical	93.4	93.9	94.4		
	Depth	6.6	7.1	7.6		
Weight		76.5	91.5	106.5	g	

1. Absolute Maximum Ratings

1.1 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T_{STG}	-25	60	℃	
Operating temperature (Ambient temperature)	T_{OPR}	0	50	℃	

Note 1) Temperature and relative humidity range are shown in the figure below.

95 % RH Max. (40 °C > Ta)

Maximum wet - bulb temperature at 39 C or less. (Ta > 40°C) No condensation.
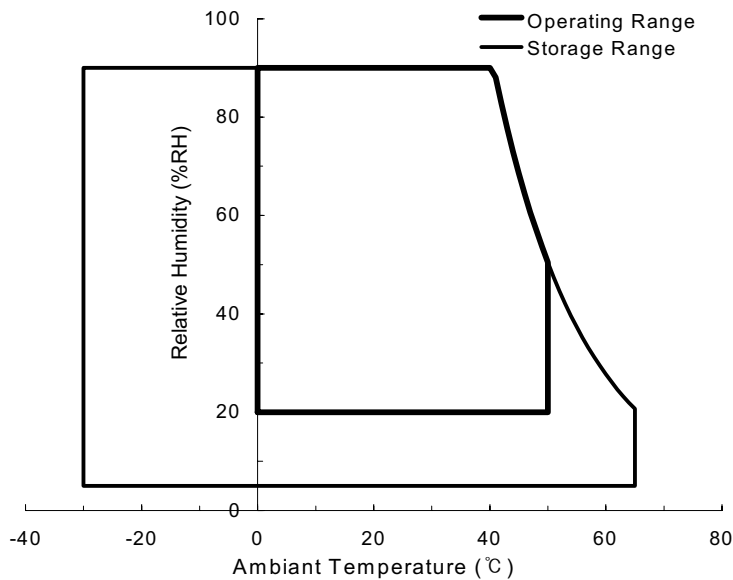
1.2 Electrical Absolute Ratings

(1) TFT-LCD Monitor   (Ta=25±2°C,V_{gg}=GND=0V)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Input Voltage	VDD1	2.85	3	3.3	V	(1)
Input Voltage2	VDD2	4.75	5	5.25	V	(1)
Input Voltage3	Von	20	21	22	V	(1)
Input Voltage4	Voff	-11	-10	-9	V	(1)
Power Consumption1	P_{VDD1}		4		mA	(1)
Power Consumption2	P_{VDD2}		17		mA	(1)
Power Consumption3	P_{Von}		1		mA	(1)
Power Consumption4	P_{VOFF}		1		mA	(1)

Note 1) Whin operating temperature.

(2) Back-Light Unit

ITEM	SYMBOL	MIN.	TYP	MAX.	UNIT	NOTE
Lamp Current	I_L	2.0	–	5.5	mA$_{rms}$	(1)
Lamp frequency	f_L	–	62.936	–	kHz	(1)
Lamp Voltage	V_L		(665)		Vrms	(2)

Note 1) Brightness Range : OSD Min./Max.

Note 2) Lamp Current 5.0mArms
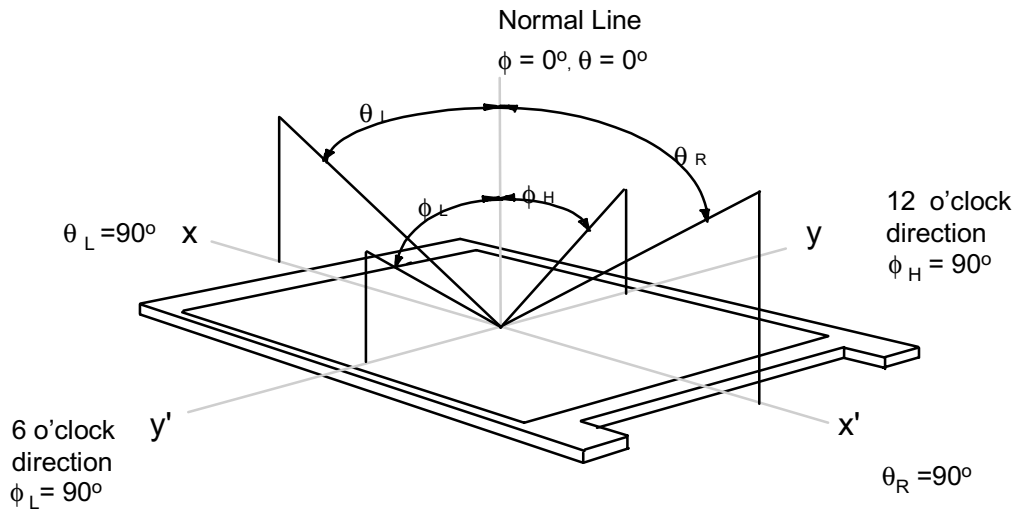
2. Optical Characteristics

The following items are measured under stable conditions.   The optical characteristics
should be measured in a dark room or equivalent state. Measuring equipment: BM-5A.

(VDD1=3V, VDD2=5V, fV=60Hz, fH=15.734kHz, Built-in inverter, Ta = 25 ± 2°C)

| ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast Ratio		CR		200	–	–		2)-①
Response time at 25 ℃	Rising	TR		–	–	10	ms	3)
	Falling	TF		–	–	40		
Average Luminance of White(9 Points)		YL,AVE	φ =0 θ =0	–	(400)	–	cd/㎡	2)-②
Center Luminance		Y$_L$		–	350	–		
Color Gamut			Viewing Normal Angle	–	42	45	%	Measuring Equipment: PR-650 1)
Color Chromaticity (CIE 1931)	Red	RX		± 0.0 25	0.580	± 0.02 5		
		RY			0.340			
	Green	GX			0.308			
		GY			0.537			
	Blue	BX			0.153			
		BY			0.124			
	White	WX			0.310			
		WY			0.320			
Viewing Angle	Hor.	θ L	CR≥ 10	45	–	–	Degrees	1)
		θ R		45	–	–		
	Ver.	φ H		30	–	–		
		φ L		10	–	–		
9 Points White Variation		δ W		–	–	2.0		2)-③

* Luminance measurement condition: 1. OSD Key Setting : Maximum Luminance

Note 1) Definition of Viewing Angle : Viewing angle range (10 ≤ CR)

Normal Line
$\phi = 0^o, \theta = 0^o$

θ_L

θ_R

ϕ_L ϕ_H

$\theta_L = 90^o$ x

y

12 o'clock
direction
$\phi_H = 90^o$

6 o'clock
direction
$\phi_L = 90^o$ y'

x'

$\theta_R = 90^o$

Note 2) Definition of Average Luminance of White, 9points White variation, Contrast Ratio

ACTIVE AREA (H:101.76mm/ V:76.36mm)

1/6H   1/6H

1/6V

9   8   7

6   5   4

3   2   1

1/6V

◯ : test point
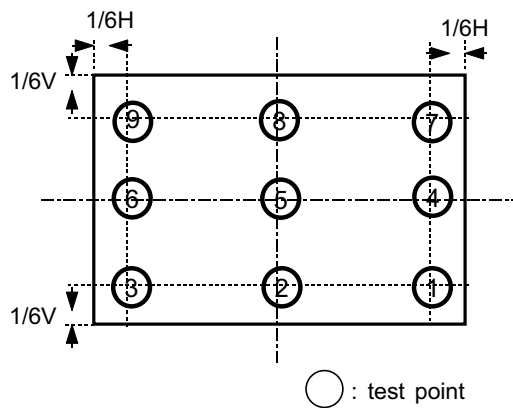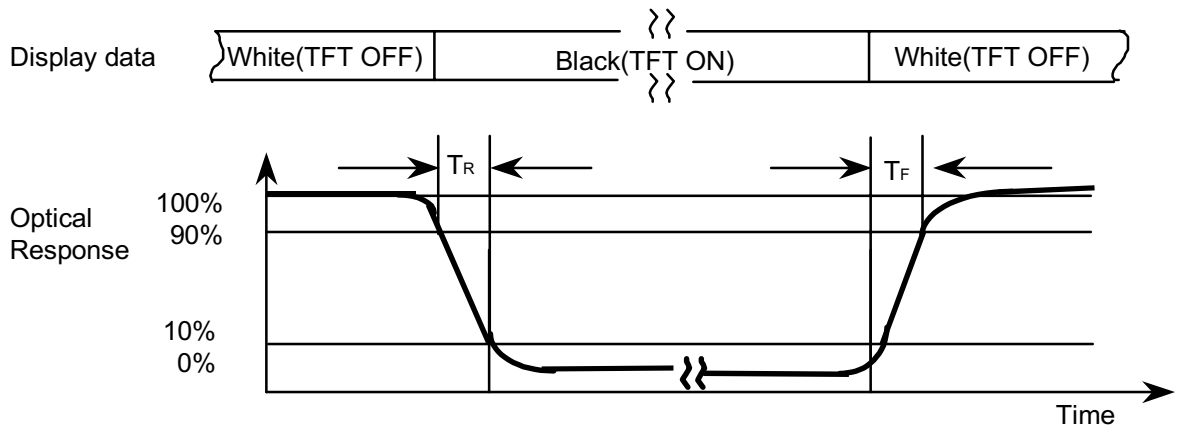
① Definition of Contrast Ratio (CR) : Ratio of gray max (Gmax), gray min (Gmin)
   at 9 points

② Definition of Average Luminance of White : measure the luminance of white
   at 9 points.

③ Definition of White Variation(δ w) : measure the Variation at 9 points.

Note 3) Definition of Response time : Sum of T_R, T_F

Display data   White(TFT OFF)   Black(TFT ON)   White(TFT OFF)

Optical Response

100%
90%

10%
0%

T_R

T_F

Time

Note 4) Test Equipment Setup

After stabilizing and leaving the panel alone at a given temperature for 30 min, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. 30 min after lighting the Front-light or reference light source. The reflected light intensity should be measured in the center of screen. The incident angle of the light source is 30° to the normal direction where the photodetector is positioned.

Environment condition : Ta = 25 ± 2 °C

Photodetector

Field = 2°

d

TFT - LCD Module

LCD Panel

The center of the screen
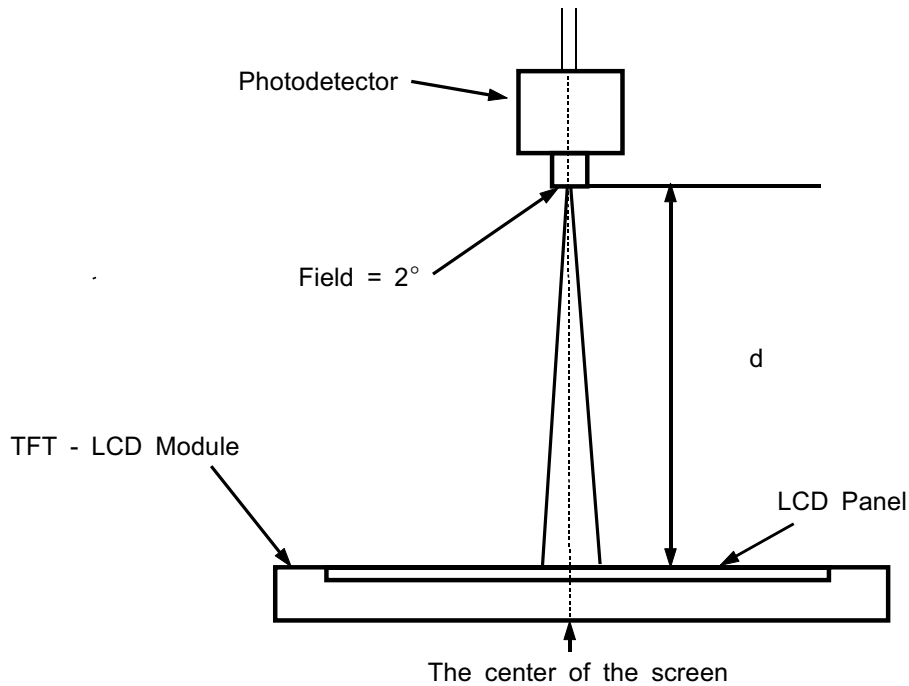
* Photodetector : BM-5A (d = 40cm), PR-650 (d = 50cm)

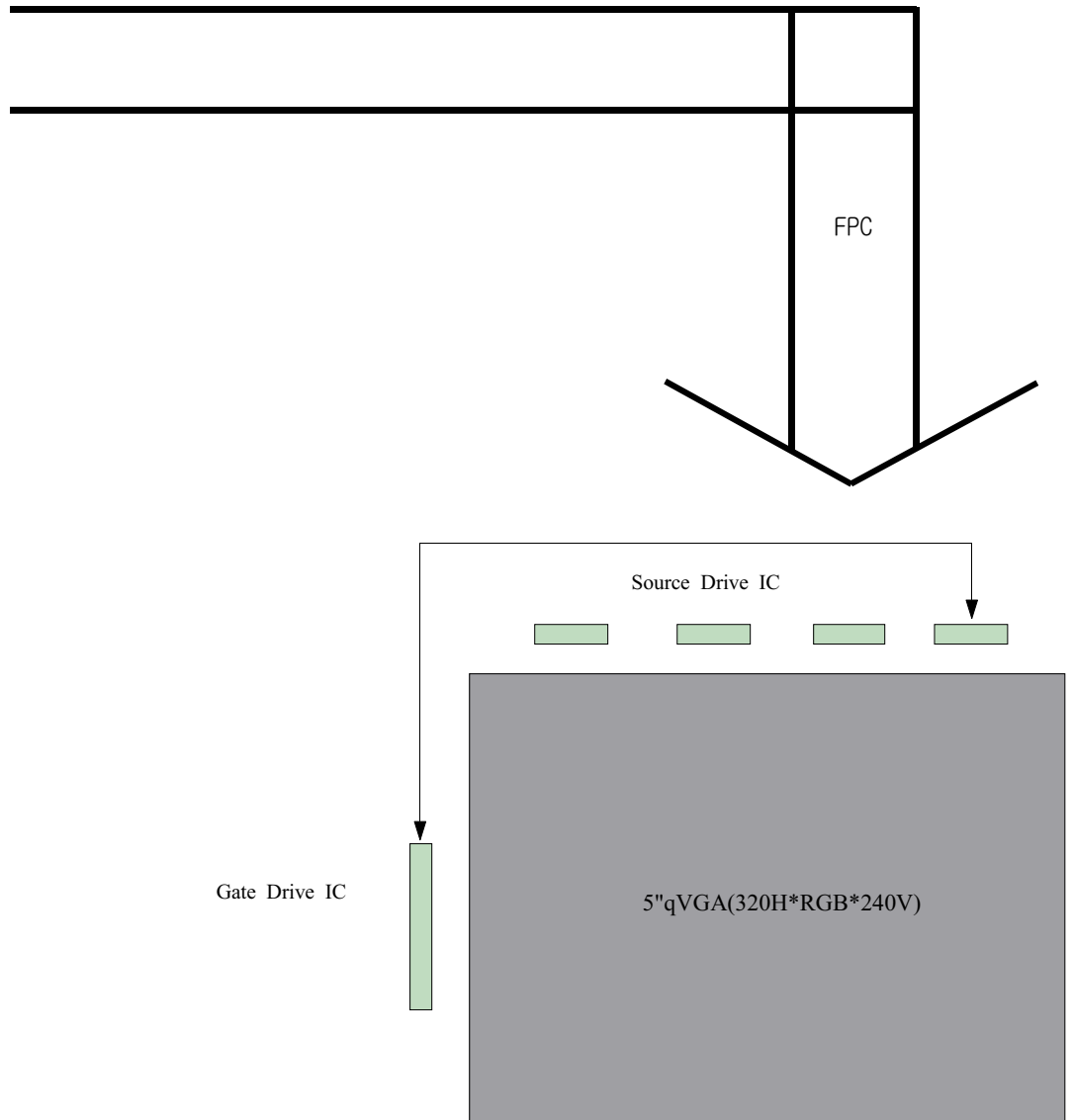# 3. Electrical Specification

3.1 Interface signals pin assignment

Pin	Signal	Description
1	GND	Ground
2	VCOMS	L/C Conversion Pulse 1
3	GND	Ground
4	STH	Source IC Start Pulse
5	VBS	Bias Control Voltage
6	GND	Ground
7	RIN	Analog Red Data Input
8	GIN	Analog Green Data Input
9	BIN	Analog Blue Data Input
10	GND	Ground
11	OE	Output Enalble Signal
12	VDD1	Input Voltage1
13	MOD	Smpling Mode selection Terminal
14	GND	Ground
15	CPH1	Source IC Clock1
16	CPH2	Source IC Clock2
17	CPH3	Source IC Clock3
18	GND	Ground
19	VDD2	Input Voltage 2
20	VDD2	Input Voltage 2
21	STV	Gate IC Start Pulse
22	OEV	GATE IC Output Enable Signal
23	CPV	Gate IC Clock
24	GND	Ground
25	VOFF	Gate IC Output Part Ground Vlotage
26	GND	Gound
27	VDD1	Input Voltage 1
28	VON	Gate IC Output Part Drive Voltage
29	GND	Ground
30	VCOMG	L/C Conversion Pulse 2

4. Block Diagram

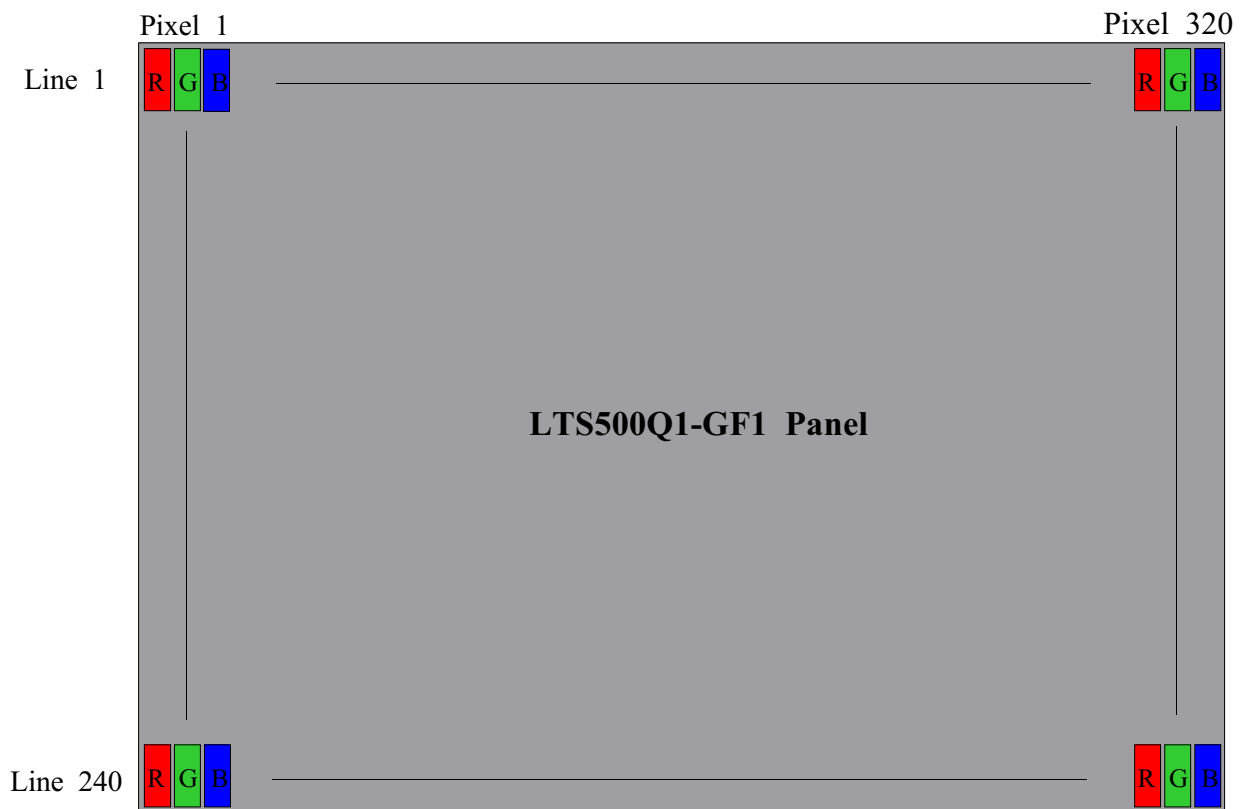## 4.1 TFT-LCD Module

(INPUT Signal)

#1 GND
#2 VCOMS
#3 GND
#4 STH
#5 VBS
#6 GND
#7 R_IN
#8 G_IN
#9 B_IN
#10 GND
#11 OE
#12 VDD1
#13 MOD
#14 GND
#15 CPH1
#16 CPH2
#17 CPH3
#18 GND
#19 VDD2
#20 VDD2
#21 STV
#22 OEV
#23 CPV
#24 GND
#25 VOFF
#26 GND
#27 VDD
#28 VON
#29 GND
#30 VCOMG

FPC

Source Drive IC

Gate Drive IC

5"qVGA(320H*RGB*240V)

4.2 Back Light

REFLECTOR

LAMP

Connector : BHTR-02VS

1 HOT(PINK)

2 COLD(WHITE)

5. Pixel Format

Pixel 1   Pixel 320

Line 1   R G B   R G B

LTS500Q1-GF1 Panel

Line 240   R G B   R G B

6. Outline Dimensions

6.1 Module Outline Dimensions

- Refer to the Next Page.

SECTION B-B' (S=2/1)

FPC
DRIVER IC
COLOR FILTER POL
COLOR FILTER
TFT
TFT POL

SECTION A-A' (S=2/1)

LGP
SHEET REFLECTOR
FRAME MOLD LOWER
CCFL
SHEET DIFFUSER
FRAME MOLD UPPER
CHASSIS TOP

CAUTION HIGH VOLTAGE

LJ96-0050BA LTS50001-GF1

* NOTE

CCFT LAMP CONN. SPECIFICATION.
- MAKER : JST
- PART NO : BHSR-02VS-1

93.9±0.5 (OUT LINE)
21.5
2-51.7±0.3 (USER HOLE)
50 ±3
130.4±0.5 (OUT SIZE)
124.4±0.3 (USER HOLE)
117±0.3
101.76(ACTIVE SIZE)
104.4(POL SIZE)
** 105.5 +0.5 -0.3 (BEZEL OPEN)
76.32(ACTIVE AREA)
79(POL SIZE)
** 80.1 +0.5 -0.3 (BEZEL OPEN)
6.1
B
B'
7.3
A
A'
3
5.8
2-4
2-φ2
4-φ2.5
2-11.7
2-7.7
6.5
6.8
7.1±0.3

FILE NO.									WEIGHT		UNFOLDED DIM. OF. MATERIAL	REMARK
	NO	PART NAME	CODE NO	SPECIFICATION		Q'TY		FINISH	MATERIAL		
	1	OUTLINE DIMENSION		LTS50001-GF1							

GENERAL TOLERANCE

STEP	LEVEL 1	LEVEL 2	LEVEL 3
0 < X ≤ 4	±0.05	±0.1	±0.2
4 < X ≤ 16	±0.08	±0.15	±0.3
16 < X ≤ 64	±0.12	±0.25	±0.5
64 < X ≤ 256	±0.25	±0.4	±0.8

REV	DATE	DESCRIPTION OF REVISION			
		DRA'N BY	DES'D BY	CHK'D BY	APP'D BY
UNIT mm			S.J.LEE	J.G.LEE	Y.B.CHU
SCALE 1/1					
TOLERANCE LEVEL3		01.08.14			

SPEC. NO
REASON
CHK'D BY
MODEL NAME   LTN500Q1-GF1
PART NAME   OUTLINE DIMENSION
CODE NO.
SHEET 3/3
VER. 00

SAMSUNG ELECTRONICS

7. General Precautions

7.1 Handling

(a) When the module is assembled, it should be attached to the system firmly.
Be careful not to twist and bend the module.

(b) Refrain from strong mechanical shock and / or any force to the module.   In
addition to damage, this may   cause improper operation or damage to the module
and back-light unit.

(c) Note that polarizers are very fragile and could be easily damaged. Do not press
or scratch the surface harder than a HB pencil lead.

(d) Wipe off water droplets or oil immediately.   If you leave the droplets for a long
time, Staining   and discoloration may occur.

(e) If the surface of the polarizer is dirty,   clean it using some absorbent cotton or
soft cloth.

(f) The desirable cleaners are   water, IPA(Isopropyl Alcohol) or Hexane.
Do not use   Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl
acid or Methyl chloride. It might permanent damage to the polarizer   due to
chemical reaction.

(g) If the liquid crystal material leaks from the panel, it should be kept away
from the eyes or mouth . In case of contact with hands, legs or clothes, it must
be washed away thoroughly with soap.

(h) Protect the module from static , it may cause damage to the CMOS Gate Array IC.

(i) Use finger-stalls with soft gloves in order to keep display clean during the
incoming inspection and assembly process.

(j) Do not disassemble the module.

(k) Protection film for polarizer on the module shall be slowly peeled off just before use
so that the electrostatic charge can be minimized.

(l) Pins of I/F connector shall not be touched directly with bare hands.

7.2 Storage

(a) Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C and relative humidity of less than 70%.

(b) Do not store the TFT-LCD module in direct sunlight.

(c) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light   during the store.

7.3 Others

(a) The liquid-crystal is deteriorated by ultraviolet rays. Do not leave it in direct sunlight and strong ultraviolet rays for many hours.

(b) Avoid condensation of water. It may result in improper operation or disconnection of electrode.

(c) Do not exceed the absolute maximum rating value. (the supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on)
Otherwise the panel may be damaged.

(d) If the panel displays the same pattern continuously for a long period of time, it can be the situation when the image "Sticks" to the screen.

(e) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.