DATA MODUL

SPECIFICATION

easy /// TOUCH DISPLAY

eTD043W2105-POA-E (12039375)
4.3" – 480x272 - COF

Version: 1.3
Date: 20.01.2020

Note: This specification is subject to change without prior notice

Content

1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Display Resolution	480*3(RGB) * 272 Dots
LCD Type	a-Si TFT, Normally white, Transmissive type
Screen size(inch)	4.3 inch
Viewing Direction	6 O'clock
Surface treatment	Anti-Glare(LCD)
	Clear(T/P)
Color configuration	R, G, B Vertical Stripe
Interface	24 Bits RGB Interface
Driver IC	ILI6480B
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer website : http://www.powertip.com.tw/news.php?area_id_view=1085560481/

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	123.34(W) x 82.14 (L) x 4.53(H)	mm

LCD panel

Item	Standard Value	Unit
Active Area	95.04 (W) x 53.86 (L)	mm

Note: For detailed information please refer to LCM drawing.

1.3 Absolute Maximum Ratings
Module

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply for TFT Panel	V_{DD}	GND=0V	-0.3	4.5	V
Power Supply for Backlight Unit	V_{CC}	GND=0V	-0.3	+20.0	V
Operating Temperature	T_{OP} (Ts)	Note 1	-20	+70	°C
Storage Temperature	T_{ST} (Ta)	Note 2	-30	+80	°C
Storage Humidity	H_D	Ta $\leqq$ 60 °C	10	90	%

The absolute maximum rating values of this product are not allowed to be exceeded
at any times. Should a module be used with any of the absolute maximum ratings exceeded, the
characteristics of the module may not be recovered, or in an extreme case, the module may be
permanently destroyed.

Note 1 : Ts is the temperature of panel's surface.

Note 2 : Ta is the ambient temperature of samples.

1.4 DC Electrical Characteristics
Module   GND = 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply for Backlight Unit	V_{CC}	GND=0V	5	12	15	V
Input Voltage for TFT Panel	V_{IH}	GND=0V	$0.7V_{DD}$	-	V_{DD}	V
	V_{IL}	GND=0V	0	-	$0.3V_{DD}$	
Supply Current for TFT Panel	I_{DD}	I_{DD}@V_{DD}=3.3V	-	13	20	mA
Supply Current for Backlight Unit	I_{CC}	I_{CC}@V_{CC}=5V	-	180	270	
Supply Current for Backlight Unit	I_{CC}	I_{CC}@V_{CC}=12V	-	160	240	
Input Voltage for PWM Signal	V_{PH}	GND=0V	1.2	-	-	V
	V_{PL}	GND=0V	-	-	0.4	V
Dimming Clock Rate	fP	GND=0V	5	-	100	KHz

1.5 Optical Characteristics

VDD = 3.3 V, Ta=25°C

| Item		Symbol	Condition	Min.	Typ.	Max.	unit	
Response time		Tr + Tf	-	-	29	44	ms	Note2
Viewing angle	Top	θ+	CR ≥ 10	-	60	-	Deg.	Note4
	Bottom	θ-		-	60	-		
	Left	θL		-	60	-		
	Right	θR		-	60	-		
Contrast ratio		CR	-	500	600	-	-	-
Color of CIE Coordinate (B/L & T/P)	White	X	VCC=5V PWM="High" (Duty=100%)	0.25	0.30	0.35	-	Note1
		Y		0.28	0.33	0.38		
	Red	X		0.53	0.58	0.63		
		Y		0.28	0.33	0.38		
	Green	X		0.29	0.34	0.39		
		Y		0.56	0.61	0.66		
	Blue	X		0.10	0.15	0.20		
		Y		0.02	0.07	0.12		
Average Brightness Pattern=white display (B/L & T/P)*1		IV	VCC=5V PWM="High" (Duty=100%)	400	560	-	cd/m^2	Note1
Uniformity (B/L & T/P)*2		△B		70	-	-	%	Note1

Note 1:

*1：$\triangle B = B(min) / B(max) * 100\%$
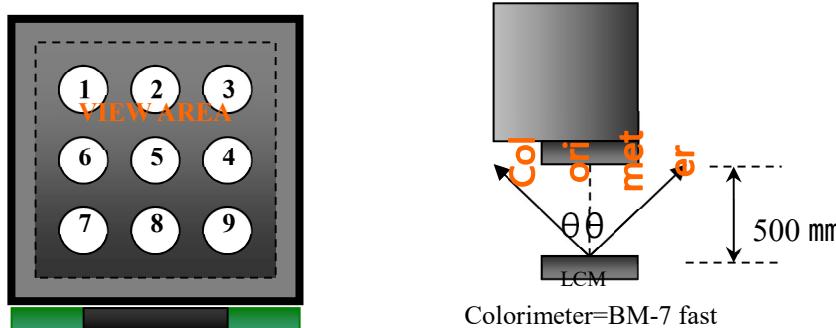
*2：Measurement Condition for Optical Characteristics:

    a：Environment: 25□±5□ / 60±20%R.H，no wind，dark room below 10 Lux at typical lamp current and typical operating frequency.

    b：Measurement Distance: 500 ± 50 ㎜ ，($\theta= 0°$)

    c：Equipment: TOPCON BM-7 fast，(field 1°)，after 10 minutes operation.

    d：The uncertainty of the C.I.E coordinate measurement ±0.01，Average Brightness ± 4%


Colorimeter=BM-7 fast
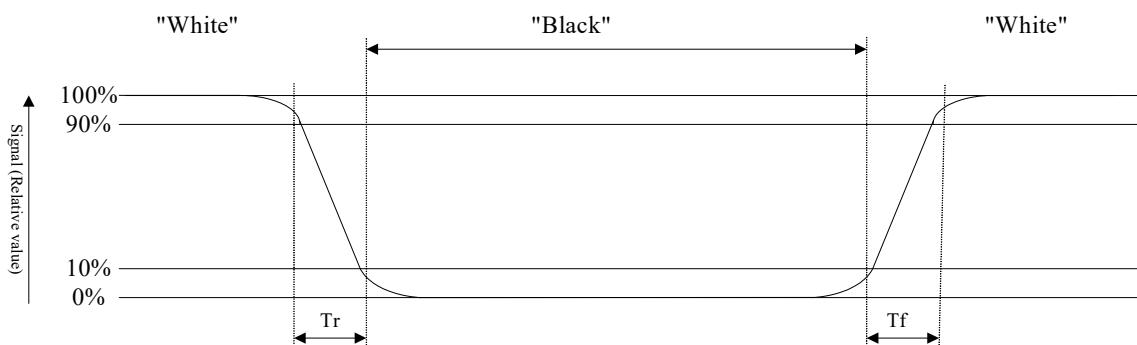
To be measured at the center area of panel with a viewing *cone of* 1° by Topcon luminance meter BM-7, after 10 minutes operation (module)

Note2: Definition of response time:
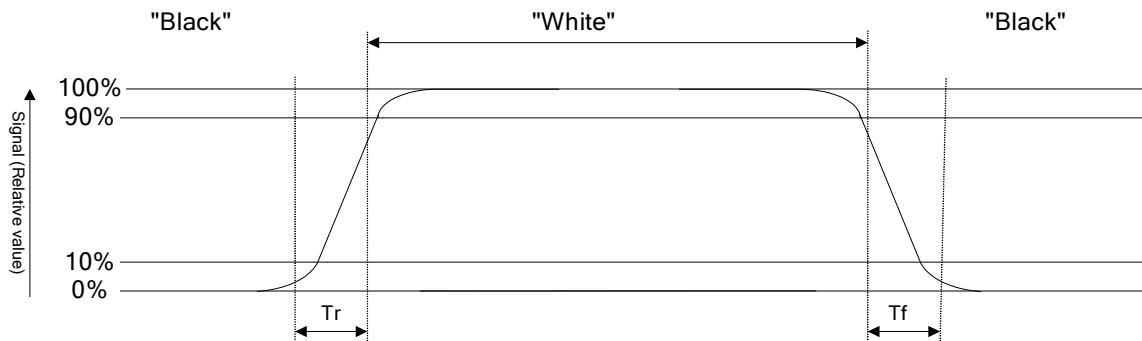
    The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

    Refer to figure as below:
    Normally White

Normally Black

"Black" "White" "Black"

100%
90%

Signal (Relative value)

10%
0%

Tr Tf

Note3: Definition of contrast ratio:
  Contrast ratio is calculated with the following formula
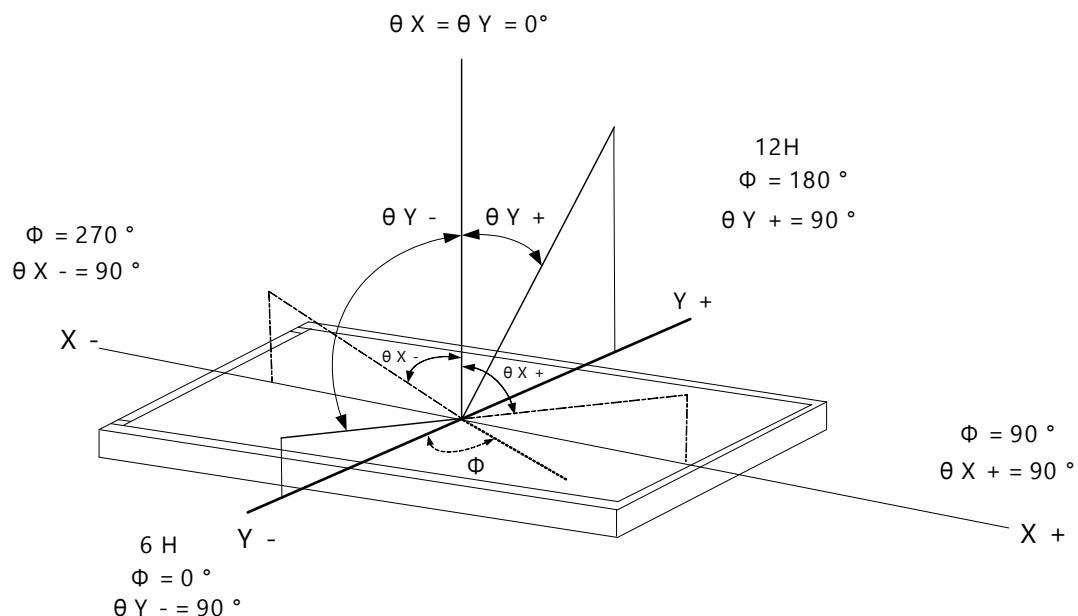
$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note4: Definition of viewing angle:
  Refer to figure as below:

$\theta X = \theta Y = 0°$

12H
$\Phi = 180°$
$\theta Y + = 90°$

$\Phi = 270°$
$\theta X - = 90°$

$\theta Y -$ $\theta Y +$

X -

$\theta X -$ $\theta X +$

Y +

$\Phi = 90°$
$\theta X + = 90°$

Φ

X +

6 H Y -
$\Phi = 0°$
$\theta Y - = 90°$

1.6 Backlight Characteristics

Maximum Ratings
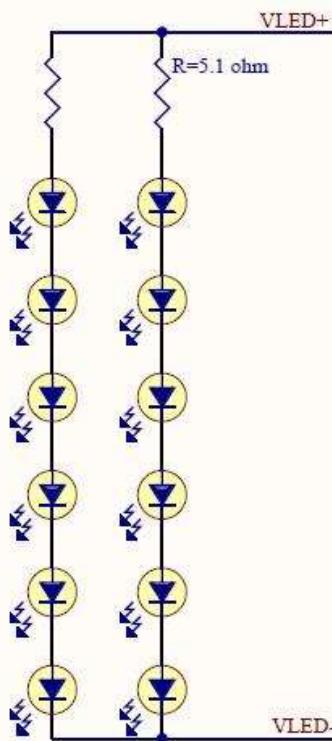
Item	Symbol	Min.	Max.	Unit	Remark
LED Forward Current	I_F		30	mA	One LED
LED Reverse Voltage	V_R		5	V	

Electrical / Optical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Voltage	V_L	17.6	19.2	20.4	V	Note1
LED Current	I_L	-	40	-	mA	-
LED life time	-	50000	-	-	HR	Note2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and I_L =40 mA.
Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and I_L =40 mA. The LED life time could be decreased if operating I_L is larger than 40 mA.

1.7 Touch Panel Characteristics
Features

Item	Standard Value
Touch Panel Size	4.3"
Touch type	Projective Capacitive Touch Panel
Input Method	Finger / 10 Points touch
Output Interface	I^{2}C / USB
IC	ILI2511
I^{2}C Address	0x41(7bit)

Mechanical Specifications

Item	Standard Value	Unit
Viewing Area	96.10 (W) x 54.90 (H)	-
Number of sensing channel	TX11 * RX19	-

Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	TPVDD	Ta = 25°C	-0.3	+6.0	V
Operating Temperature	T$_{OP}$	Ta = 25°C	-10	+60	°C
Storage Temperature	T$_{ST}$	Ta = 25°C	-20	+70	°C

DC Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	TPVDD	Ta = 25°C	3.5	-	6.0	V

Optical Characteristics

Item	Standard Value	Unit
Total light transmittance	86% or more	-
Hardness	≥6H	-

1.8 Touch Performance

This touch device offers operation with 10 fingers simultaneously. It is intended for indoor use in industrial applications.
This module is designed to have single touch functionality when operating with freshwater. It is
not designed to have functionality when operating with saltwater. Ghost touches may occur and operation might not be possible.
The module is designed to have limited functionality when operating with thin gloves.
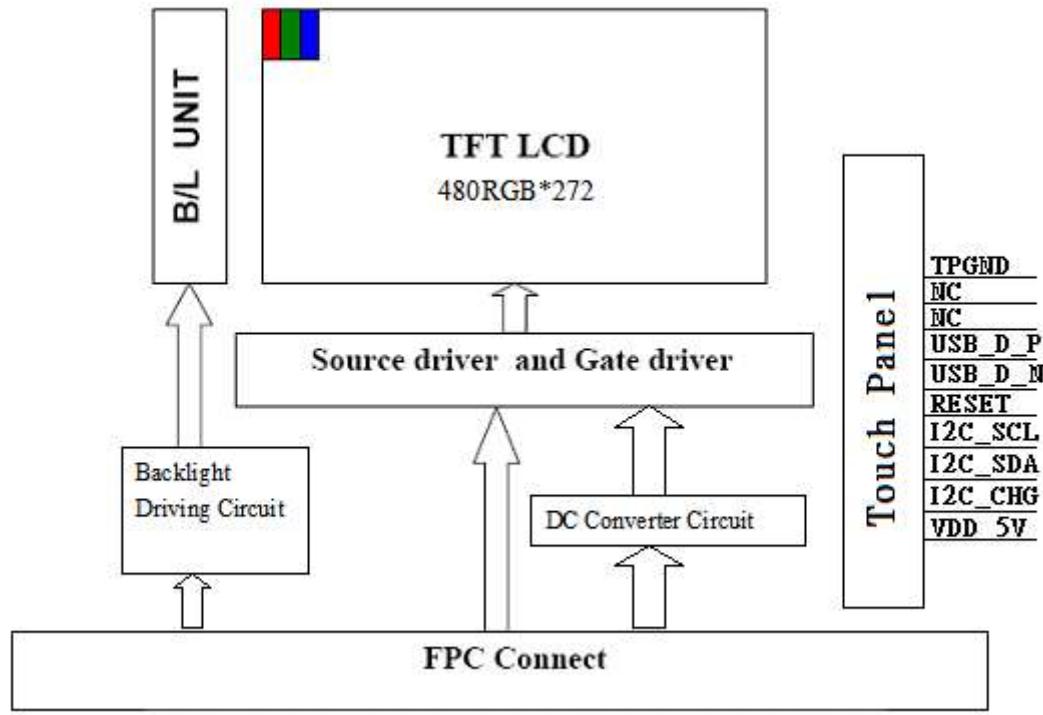
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram

2.2 Interface Pin Description
TFT LCM Interface

Pin#	Name	DESCRIPTION
1	GND	Power ground.
2	VDD	Power for Digital Circuit.
3	VDD	Power for Digital Circuit.
4	VCC	Power For LED backlight.
5	VCC	Power For LED backlight.
6	PWM	Shutdown & Dimming control input for backlight. Do not allow this pin to float. "Hi" =100%, "Low" = 0%.
7	GND	Power ground.
8	R0	Red Data.
9	R1	Red Data.
10	R2	Red Data.
11	R3	Red Data.
12	GND	Power ground.
13	R4	Red Data.
14	R5	Red Data.
15	R6	Red Data.
16	R7	Red Data.
17	GND	Power ground.
18	G0	Green Data.
19	G1	Green Data.
20	G2	Green Data.
21	G3	Green Data.
22	GND	Power ground.
23	G4	Green Data.
24	G5	Green Data.
25	G6	Green Data.
26	G7	Green Data.
27	GND	Power ground.

Pin#	Name	DESCRIPTION
28	B0	Blue Data.
29	B1	Blue Data.
30	B2	Blue Data.

31	B3	Blue Data.
32	GND	Power ground.
33	B4	Blue Data.
34	B5	Blue Data.
35	B6	Blue Data.
36	B7	Blue Data.
37	GND	Power ground.
38	HS	Line synchronization signal. Horizontal Sync Input.
39	VS	Frame synchronization signal. Vertical Sync Input.
40	GND	Power ground.
41	DE	Display enable pin from controller. Data Input Enable.
42	GND	Power ground.
43	DCLK	Sample clock. Data will be latched at the falling edge of DCLK.
44	GND	Power ground.
45	CS(NC) / ID1	No Function. / ID [4:1] These pins select LCM type.
46	SDIN(NC) / ID2	No Function. / ID [4:1] These pins select LCM type.
47	SCK(NC) / ID3	No Function. / ID [4:1] These pins select LCM type.
48	DISPLAY CONTROL / ID4	Display Enable (Hi Active). / ID [4:1] These pins select LCM type.
49	/RESET	Global Reset (Low Active).
50	GND	Power ground.

Capacitive Touch Panel (CTP) Interface

Pin#	Name	DESCRIPTION
1	TPVDD	Power supply for touch panel
2	I2C_CHG	Interrupt
3	I2C _SDA	Serial data line
4	I2C _SCL	Serial clock line
5	Reset	Reset
6	USB_D_N	D-
7	USB_D_P	D+
8	NC	NC
9	NC	NC
10	GND	GND

2.3 Touch Panel Description
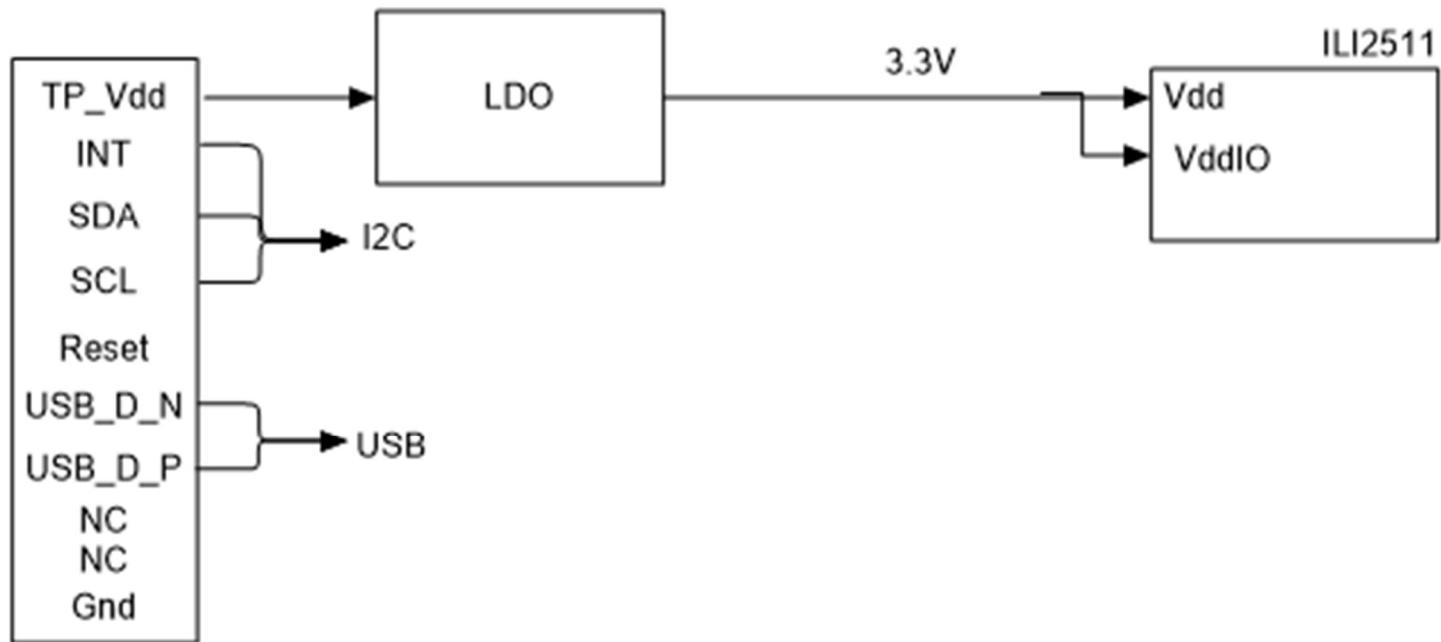
The touch panel can be operated either via I2C or via USB. A list of supported operating system is given in the following table. For drivers listed in the table, please contact your regional Data Modul sales contact.
A recommended connector for the touch tail is OMRON XF2M-1015-1A.
For easy design-in, Data Modul can provide additionally an adaptor for I2C and USB connection (incl. corresponding USB cable). Please contact your regional Data Modul sales contact for further details.

System	Interface	Function	Driver Version	Document
Windows 10 Windows 8 Embedded 8.1 Industry Embedded 8.1 Pro Embedded 8 Standard	USB	Multi Touch	Windows In-Box Driver	N/A
Windows 7 Windows Embedded 7 Embedded Enterprise 7 Embedded Standard 7 Embedded POSReady7	USB	Multi Touch	Windows In-Box Driver	N/A
Linux 2.6.36 Upward	USB	Multi Touch	Linux In-Box Driver	N/A
Linux 2.6.36 Upward	I2C	Multi Touch	ilitek_limv5_7_0_0	ILITEK_LINUX_I2C_DRIVER_CHS_V0.0.6
RTOS	I2C	Depends on system	NA	Please contact your Data Modul Sales Representative I

2.3.1 Block Diagram

2.3.2 I2C Operation

TP_VDD, I2C_CHG, I2C _SDA , I2C _SCL and RESET lines are needed for I2C operation. External pull up resistors on SDA and SCL lines are required (recommendation 4.7kΩ). On INT as well as Reset line, there is no additional pull up resistors required. Please note that VddIO voltage is always 3.3V since this voltage is derived from the LDO on the flex tail.
For detailed documentation on the software integration of I2C, please contact your regional Data Modul sales contact.
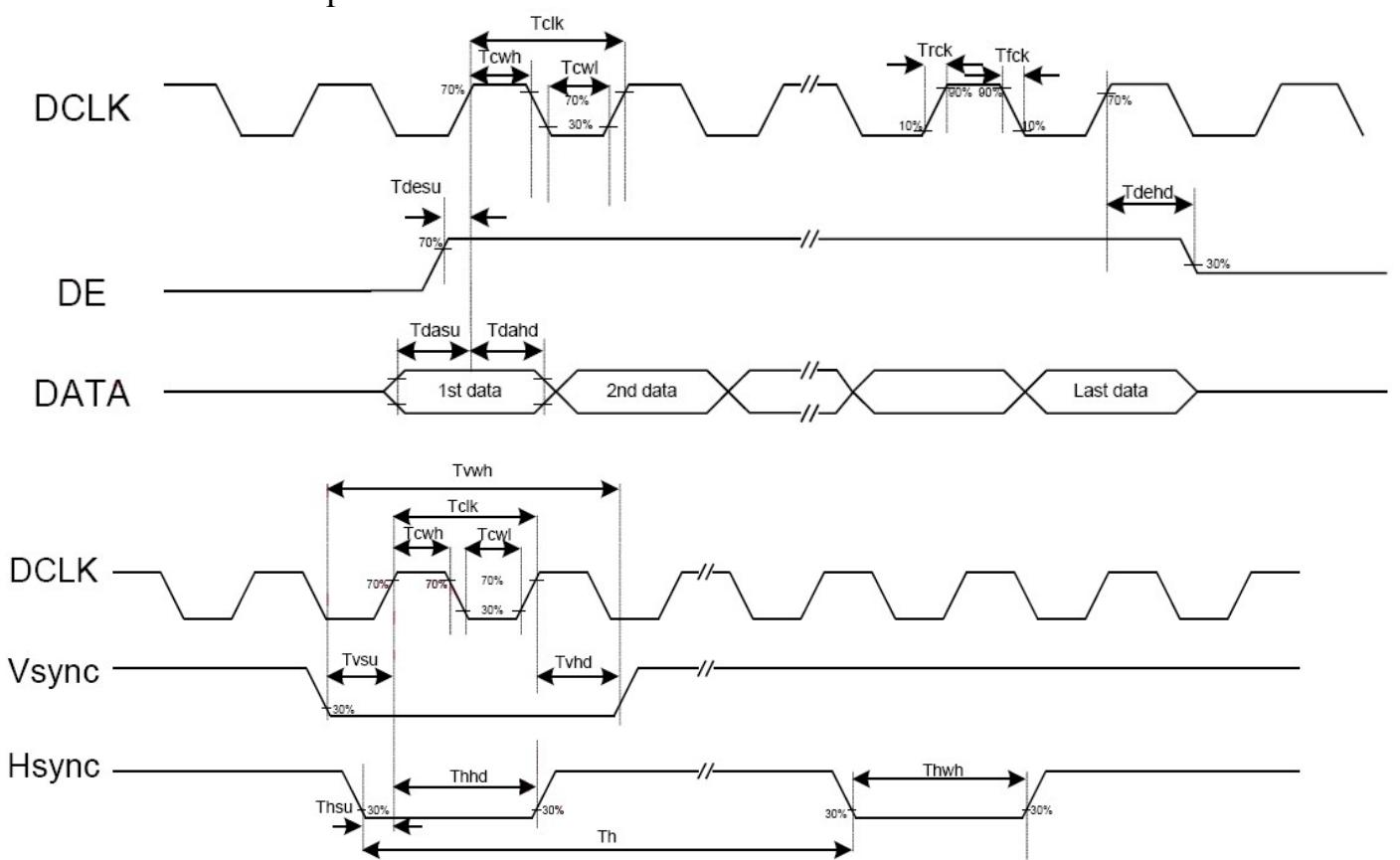
2.3.3 USB Operation

TP_VDD, USB_D_N and USB_D_P are needed for USB operation. The TP will work with most Windows version out of the box using built-in drivers (HIDUSB driver) as well as with Linux.
Please note that Data Module offers the easyAnalyzer, a visualization and evaluation software, for Windows as well as x86 Linux systems. Please contact your regional Data Modul sales contact for further details.

2.4 TFT LCM Timing Characteristics
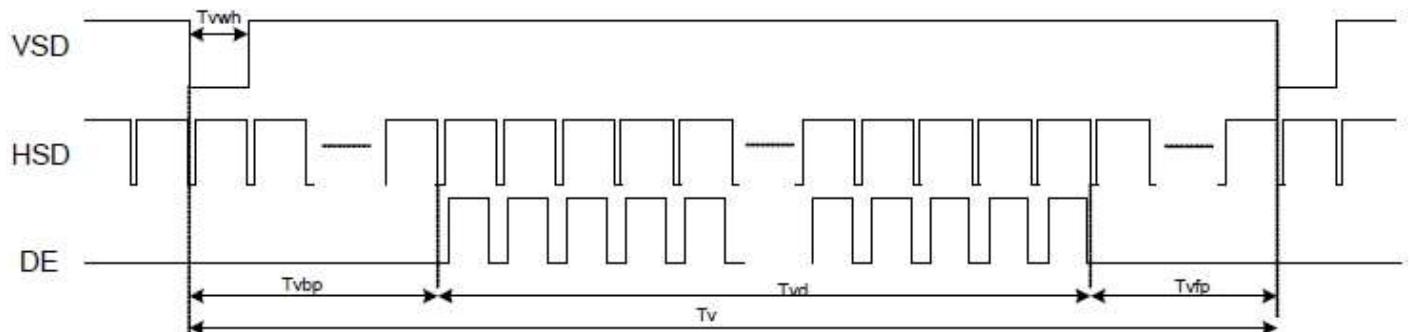
2.4.1 Clock and Data Input Waveforms

Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
System operation timing						
VDD power source slew time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
Input Output timing						
DCLK clock time	Tclk	33.3	-	-	ns	DCLK=30MHz
DCLK clock low period	Tcwl	40	-	60	%	
DCLK clock high period	Tcwh	40	-	60	%	
Clock rising time	Trck	9	-	-	ns	
Clock falling time	Tfck	9	-	-	ns	
HSD width	Thwh	1	-	-	DCLK	
HSD period time	Th	55	60	65	us	
HSD setup time	Thsu	12	-	-	ns	
HSD hold time	Thhd	12	-	-	ns	
VSD width	Tvwh	1	-	-	Th	
VSD setup time	Tvsu	12	-	-	ns	
VSD hold time	Tvhd	12	-	-	ns	
Data setup time	Tdasu	12	-	-	ns	
Data hold time	Tdahd	12	-	-	ns	
DE setup time	Tdesu	12	-	-	ns	
DE hold time	Tdehd	12	-	-	ns	
Source output setting time	Tsst	-	-	TBD	us	10% to 90% CL=60pF, RL=2Kohm
Gate output setting time	Tgst	-	-	TBD	ns	10% to 90%, CL=60pF
VCOM output setting time	Tcst	-	-	TBD	us	10% to 90%, CL=40nF, RL=50ohm
Time from VSD to 1st line data input	Tvs	3	8	31	Th	HV mode By HDL[4:0] setting
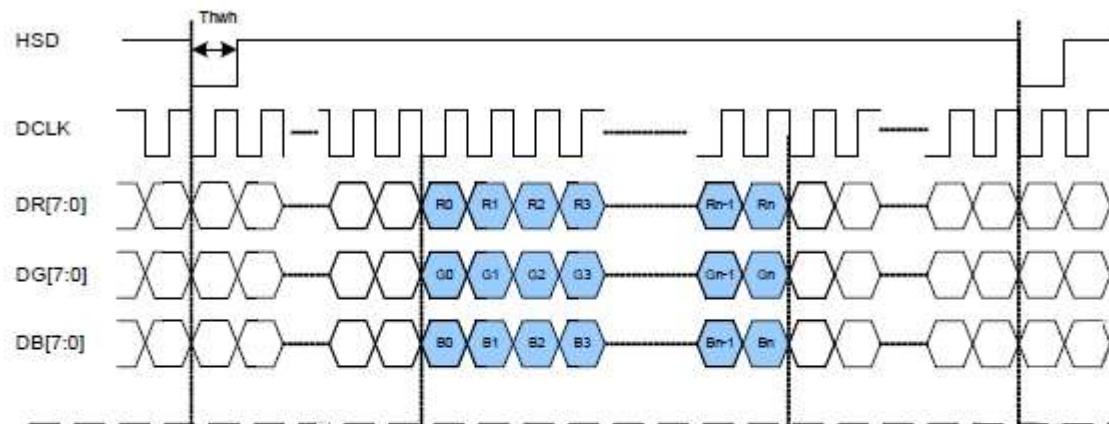
2.4.2 Data Input Format

Vertical input timing
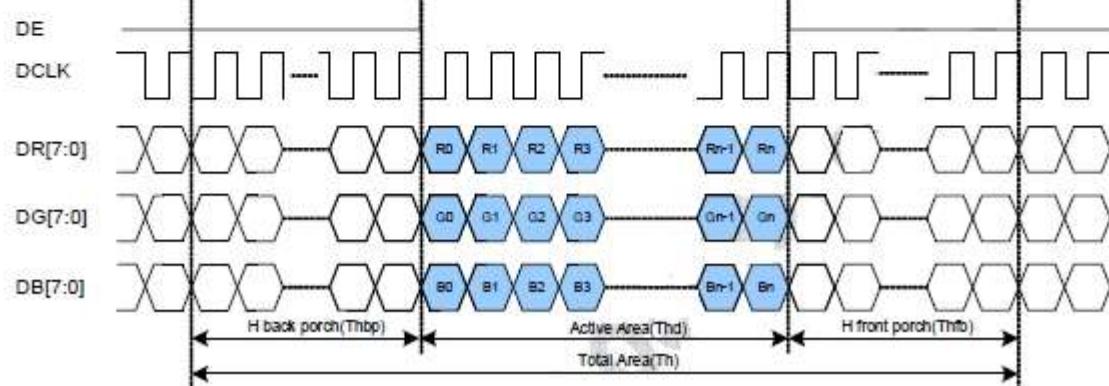
Parallel RGB Mode Data format

(HV Mode)
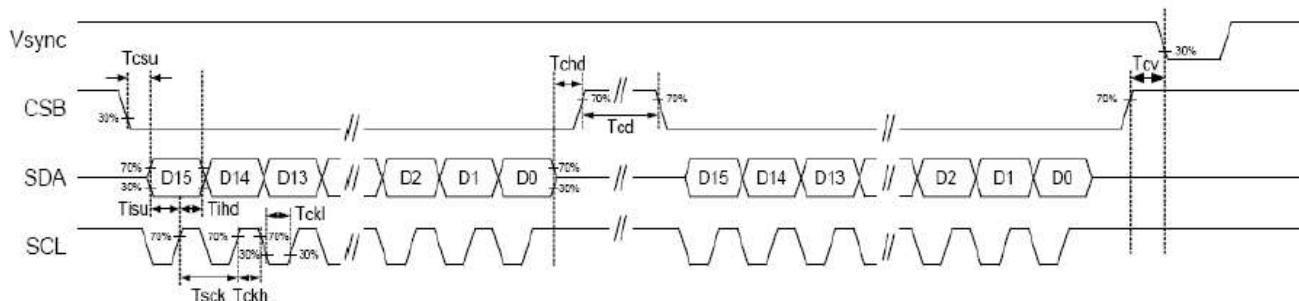
(DE Mode)

Parallel RGB input timign table

Parameters	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	Fclk	5	9	12	MHz
VSYNC period time	Tv	277	288	400	H
VSYNC display area	Tvd		272		H
VSYNC back porch	Tvb	3	8	31	H
VSYNC front porch	Tvfp	2	8	97	H
HSYNC period time	Th	520	525	800	DCLK
HSYNC display area	Thd		480		DCLK
HSYNC back porch	Thbp	36	40	255	DCLK
HSYNC front porch	Thfp	4	5	65	DCLK

2.4.3 3-wire Timing Diagram
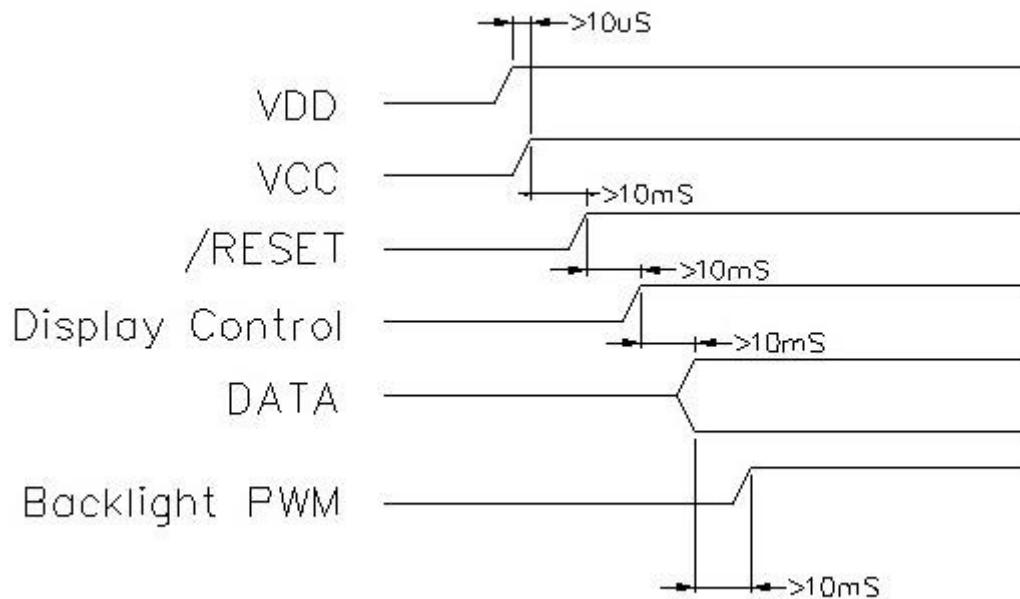
3-wire serial communication AC timing							
Serial clock	Tsck	200	-	-	ns	For SCL Pin
SCL pulse low period	Tckl	40	-	60	%	
SCL pulse high period	Tckh	40	-	60	%	
Serial data setup time	Tisu	50	-	-	ns	
Serial data hold time	Tihd	50	-	-	ns	
Serial clock high/low	Tssw	50	-	-	ns	
CSB to VSD	Tcv	1			us	
CSB distinguish time	Tcd	400	-	-	ns	
CSB input setup time	Tcsu	50	-	-	ns	
CSB input hold time	Tchd	50	-	-	ns	
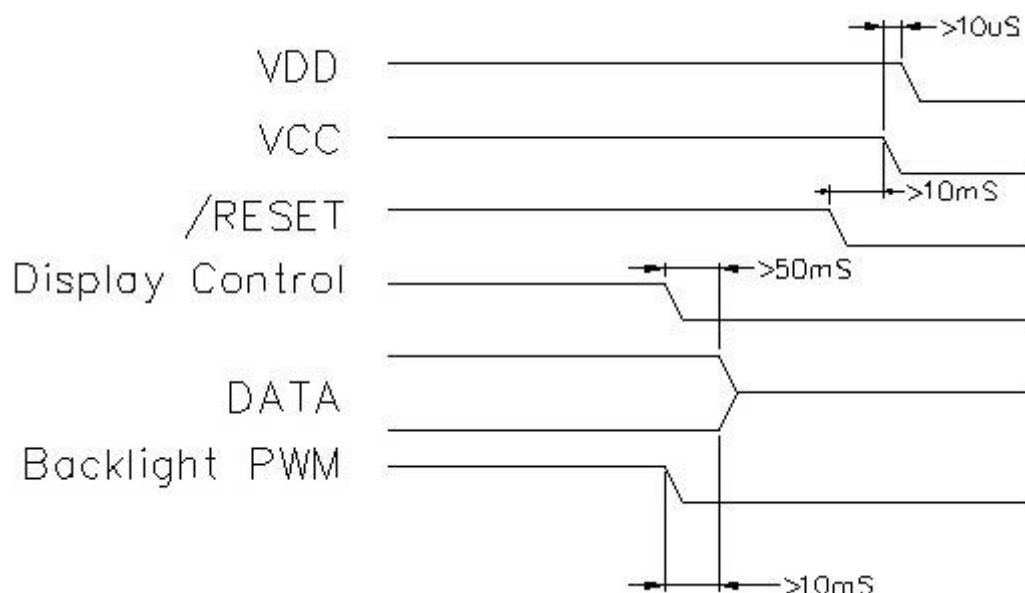
2.4.4 Power Sequence

POWER ON

VDD

VCC

/RESET

Display Control

DATA

Backlight PWM

>10uS

>10mS

>10mS

>10mS

>10mS

POWER OFF

VDD

VCC

/RESET

Display Control

DATA

Backlight PWM

>10uS

>10mS

>50mS

>10mS
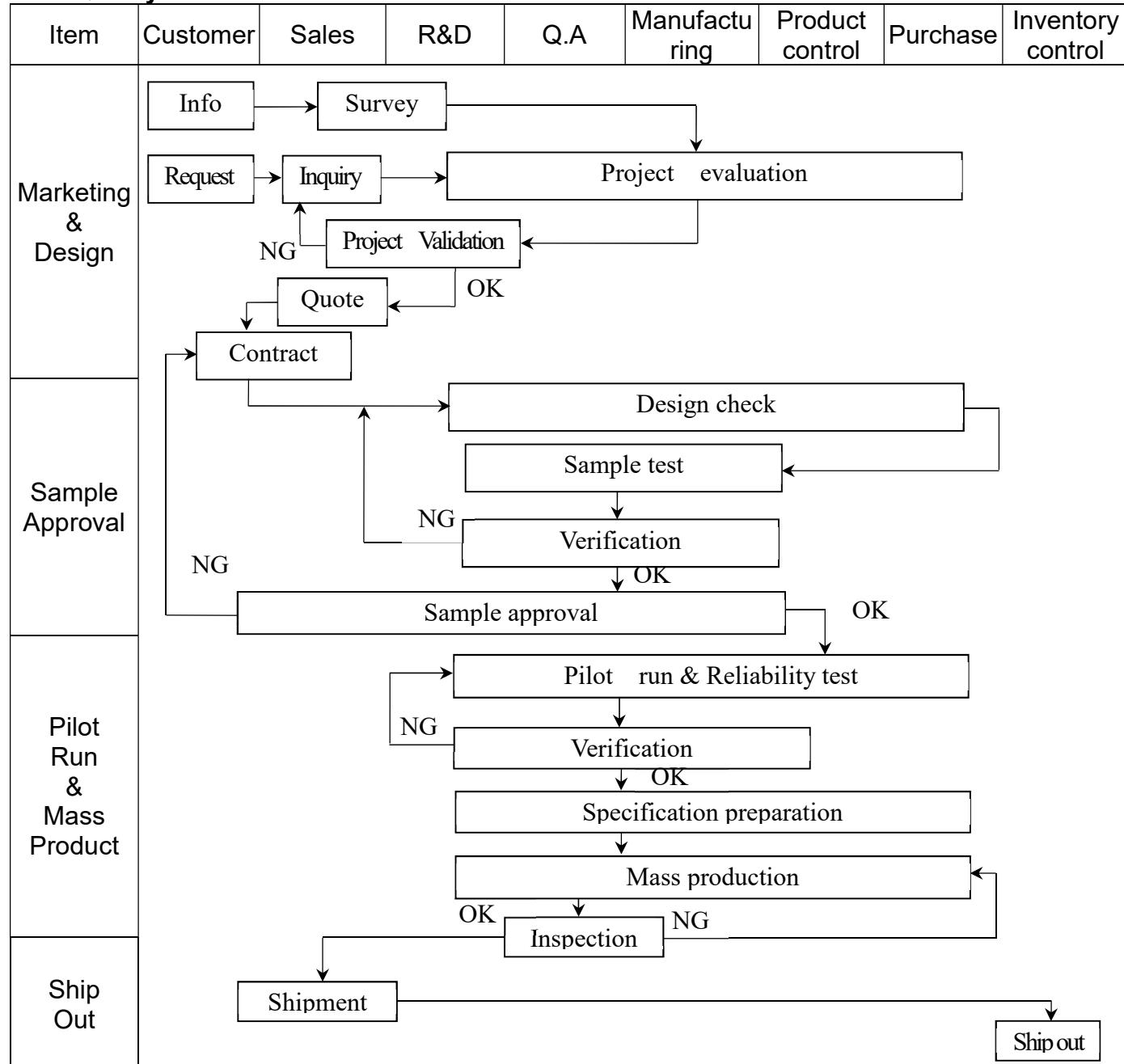
3. QUALITY ASSURANCE SYSTEM
3.1 Quality Assurance Flow Chart

Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control

Marketing & Design

Info → Survey → Project evaluation

Request → Inquiry → Project evaluation

Project Validation — NG → Inquiry; OK → Quote

Quote → Contract

Sample Approval

Contract → Design check → Sample test → Verification (NG) / OK → Sample approval

Sample approval — NG → Contract; OK → Pilot run & Reliability test

Pilot Run & Mass Product

Pilot run & Reliability test → Verification (NG → Pilot run) / OK → Specification preparation → Mass production → Inspection (OK / NG → Mass production)

Ship Out

Inspection OK → Shipment → Ship out

Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service								
Q.A Activity	1. ISO 9001 Maintenance Activities 2. Process improvement proposal 3. Equipment calibration 4. Education And Training Activities 5. Standardization Management							

Sales Service flow:

Info → Claim → Failure analysis → Analysis report

Failure analysis → Corrective action → Tracking

3.2. Inspection Specification
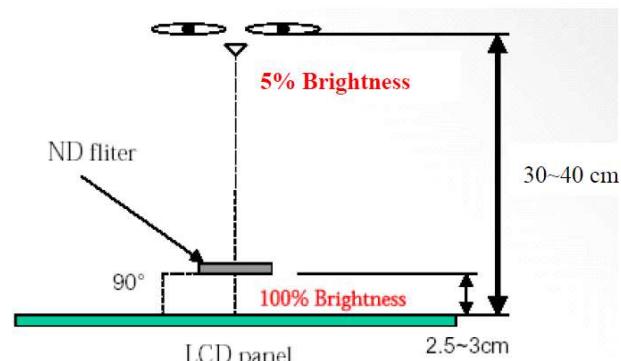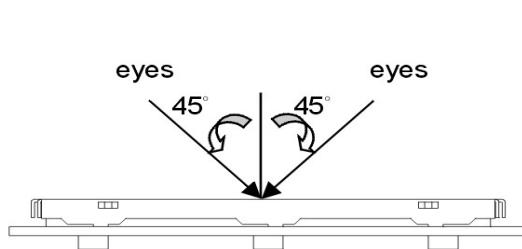
◆**Scope: The document shall be applied to TFT-LCD Module for 3.5″-15″ (Ver.B01).**

◆**Inspection Standard: MIL-STD-105E Table Normal Inspection Single Sampling Level Ⅱ.**

◆**Equipment: Gauge, MIL-STD, Powertip Tester, Sample**

◆**Defect Level: Major Defect AQL: 0.4; Minor Defect AQL: 1.5**

◆**OUT Going Defect Level: Sampling.**

◆**Standard of the product appearance test:**

   a. Manner of appearance test:
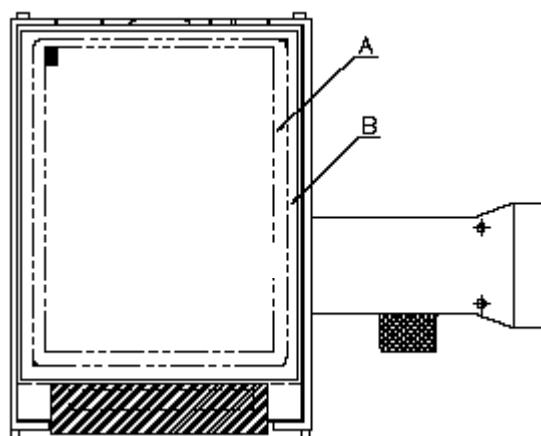
   (1). The test best be under 20W×2 fluorescent light(about 300lux ~ 500lux)

   , and distance of view must be at 30~40 cm.

   (2). The test direction is base on about around 45° of vertical line.

   (3). Definition of area.

A area: viewing area

B area: Outside of viewing area

   (4). Standard of inspection：(Unit：mm)

◆**Specification For TFT-LCD Module 3.5″~15″：**   **(Ver.B01)**
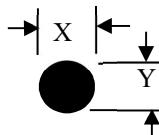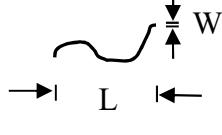
NO	Item	Criterion	Level
01	**Product condition**	**1.1The part number is inconsistent with work order of production.**	**Major**

NO	Item	Criterion		Level
		1.2 Mixed product types.		Major
		1.3 Assembled in inverse direction.		Major
02	**Quantity**	2.1 The quantity is inconsistent with work order of production.		Major
03	**Outline dimension**	3.1 Product dimension and structure must conform to structure diagram.		Major
04	**Electrical Testing**	4.1 Missing line character and icon.		Major
		4.2 No function or no display.		Major
		4.3 Display malfunction.		Major
		4.4 LCD viewing angle defect.		Major
		4.5 Current consumption exceeds product specifications.		Major
		4.6 Mura cannot be seen through 5% ND filter at 50% Gray , should be judged by the viewing angle of 90 degree.		Minor
05	**Dot defect** **(Bright dot, Dark dot)** **On -display**	<table><tr><td rowspan="4">Dot Defect</td><td>Bright Dot</td><td>≦ 4</td></tr><tr><td>Dark Dot</td><td>≦ 5</td></tr><tr><td>Joint Dot</td><td>≦ 3</td></tr><tr><td>Total</td><td>≦ 7</td></tr></table> 5.1 Inspection pattern: full white, full black, Red, Green and blue screens. 5.2 It is defined as dot defect if defect area > 1/2 dot. 5.3 The distance between two dot defect ≧ 5 mm. 5.4 Bright dot that can not be seen through 5% ND filter.		Minor

◆**Specification For TFT-LCD Module 3.5″ ~15″ :**   (Ver.B01)

NO	Item	Criterion	Level

NO	Item	Criterion	Level
06	**Black or white Dot, scratch, contamination** **Round type** X Y $\Phi = (x + y) / 2$ **Line type** W L	6.1 **Round type (Non-display or display):** {round type table} 6.2 **Line type(Non-display or display):** {line type table}	Minor
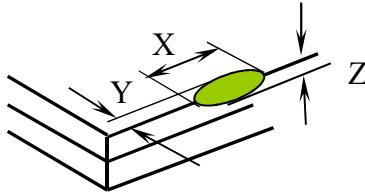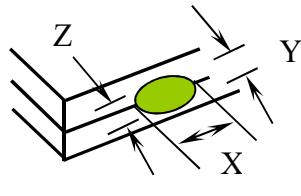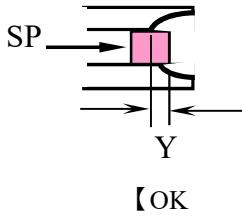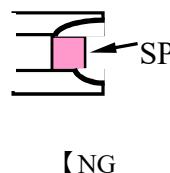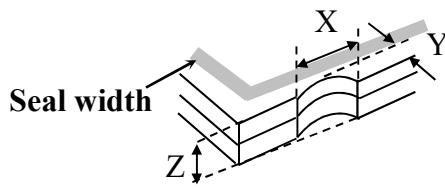
6.1 **Round type (Non-display or display):**

Dimension (diameter：Φ)	Acceptance (Q'ty)	
	A area	B area
$\Phi \leq 0.25$	Ignore	Ignore
$0.25 < \Phi \leq 0.50$	5	
$\Phi > 0.50$	0	
Total	5	

6.2 **Line type(Non-display or display):**

module size	Length (L)	Width (W)	Acceptance (Q'ty)	
			A area	B area
3.5" to less 9"	---	$W \leq 0.03$	Ignore	Ignore
	$L \leq 10.0$	$0.03 < W \leq 0.05$	4	
	$L \leq 5.0$	$0.05 < W \leq 0.10$	2	
	---	$W > 0.10$	As round type	
		Total	5	
9" to 15"	---	$W \leq 0.05$	Ignore	Ignore
	$L \leq 10.0$	$0.05 < W \leq 0.10$	5	
	---	$W > 0.10$	As round type	
		Total	5	

NO	Item	Criterion	Level
07	**Polarizer Bubble**	{bubble table}	Minor

Dimension (diameter: Φ)	Acceptance (Q'ty)	
	A area	B area
$\Phi \leq 0.25$	Ignore	Ignore
$0.25 < \Phi \leq 0.50$	4	
$0.50 < \Phi \leq 0.80$	1	
$\Phi > 0.80$	0	
Total	5	

◆**Specification For TFT-LCD Module 3.5″ ~15″:**　　　　　　　　　　　　(Ver.B01)

NO	Item	Criterion	Level

NO	Item	Criterion	Level
08	The crack of glass	**Symbols：** X: The length of crack　　Y: The width of crack. Z: The thickness of crack　　W: terminal length t: The thickness of glass　　a: LCD side length 8.1 General glass chip: 　8.1.1 **Chip on panel surface and crack between panels:** 【OK　　　　　　　　　　【NG **Seal width** （table below）	Minor

X	Y	Z
□ a	**Crack can't enter viewing area**	□1/2 t
□ a	**Crack can't exceed the half of SP width.**	1/2 t ＜ Z □2 t
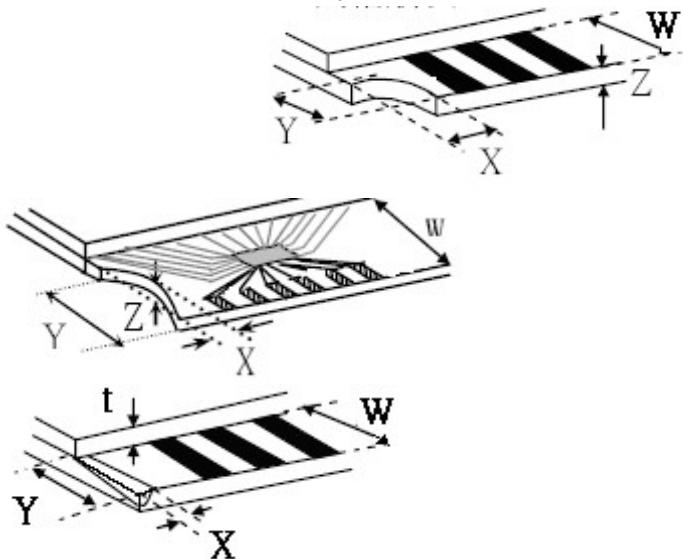
NO	Item	Criterion	Level
08	The crack of glass	Symbols： X: The length of crack Y: The width of crack. Z: The thickness of crack W: terminal length t: The thickness of glass a: LCD side length 8.1.2 Corner crack: <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>□1/5 a</td><td>Crack can't enter viewing area</td><td>Z □ 1/2 t</td></tr><tr><td>□1/5 a</td><td>Crack can't exceed the half of SP width.</td><td>1/2 t < Z □ 2 t</td></tr></table> 8.2 Protrusion over terminal: 8.2.1 Chip on electrode pad: <table><tr><td></td><td>X</td><td>Y</td><td>Z</td></tr><tr><td>Front</td><td>□ a</td><td>≦ 1/2 W</td><td>≦ t</td></tr><tr><td>Back</td><td>□ a</td><td>≦ W</td><td>≦ 1/2 t</td></tr></table>	Minor

◆**Specification For TFT-LCD Module** 3.5″ ~15″ :   (Ver.B01)

NO	Item	Criterion	Level
08	The crack of glass	Symbols: X: The length of crack Y: The width of crack. Z: The thickness of crack W: terminal length t: The thickness of glass a: LCD side length	Minor
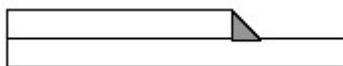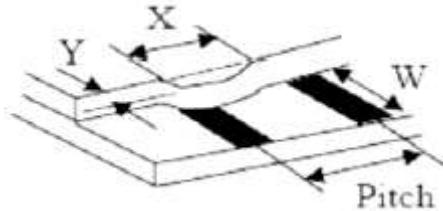
8.2.2 Non-conductive portion:

X	Y	Z
□ 1/3 a	□ W	□ t

⊙ **If the chipped area touches the ITO terminal, over 2/3 of**
  ● **the ITO must remain and be inspected according to**
  electrode terminal specifications.

8.2.3 Glass remain:

X	Y	Z
□ a	□ 1/3 W	□ t

8.2.4 Cracking:

    Not Allowed

NO	Item	Criterion	Level
09	**Backlight elements**	9.1 **Backlight can't work normally.**	**Major**
		9.2 **Backlight doesn't light or color is wrong.**	**Major**
		9.3 **Illumination source flickers when lit.**	**Major**
10	**General appearance**	10.1 **Pin type、quantity、dimension must match type in structure diagram.**	**Major**
		10.2 **No short circuits in components on PCB or FPC.**	**Major**
		10.3 **Parts on PCB or FPC must be: no wrong parts, missing parts or excess parts.**	**Major**
		10.4 **Product packaging must the same as specified on packaging specification sheet.**	**Minor**
		10.5 **The folding and peeled off in polarizer are not acceptable.**	**Minor**
		10.6 **The PCB or FPC between B/L assembled distance(PCB or FPC) is ≦1.5 mm.**	**Minor**

4. RELIABILITY TEST
4.1   Reliability Test Condition (Ver.B01)

NO.	TEST ITEM	TEST CONDITION	
1	**High Temperature Storage Test**	**Keep in** +80 **±5℃ 240 hrs**	
2	**Low Temperature Storage Test**	**Keep in** -30 **±5℃ 240 hrs**	
3	**High Temperature / High Humidity Storage Test**	**Keep in** +60 **℃ /** 90% **R.H duration for** 240 **hrs** (Excluding the polarizer)	
4	**Temperature Cycling Storage Test**	-30℃ → +25℃ → +80℃ → +25℃ (30mins) (5mins) (30mins) (5mins) 20 Cycle	
5	**ESD Test**	Air Discharge: Apply 2 KV with 5 times Discharge for each polarity +/- 1. Temperature ambiance : 15℃ ~ 35℃ 2. Humidity relative : 30% ~ 60% 3. Energy Storage Capacitance(Cs+Cd) : 150pF±10% 4. Discharge Resistance(Rd) : 330Ω±10% 5. Discharge, mode of operation : Single discharge (time between successive discharges at least 1 sec) (Tolerance if the output voltage indication : ±5%)	Contact Discharge: Apply 250 V with 5 times discharge for each polarity +/-
6	**Vibration Test (Packaged)**	1. Sine wave 10 ~ 55 Hz frequency (1 min/sweep) 2. The amplitude of vibration :1.5 mm 3. Each direction (X、Y、Z) duration for 2 Hrs	
7	**Drop Test (Packaged)**	Drop Direction :※1 corner / 3 edges / 6 sides each 1time	

For item 7, the drop table:

Packing Weight (Kg)	Drop Height (cm)
0 ~ 45.4	122
45.4 ~ 90.8	76
90.8 ~ 454	61
Over 454	46

◎Inspection conditions after test:

Temperature : +20~30°C

Humidity : 50~70%

Atmospheric pressure : 86~106Kpa

5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

5.1.1   If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.

5.1.2   If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

5.2 HANDLING

5.2.1   Avoid any strong mechanical shock which can break the glass.

5.2.2   Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.

5.2.3   Do not remove the panel or frame from the module.

5.2.4   The polarizing plate of the display is very fragile. So , please handle it very carefully ,do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)

5.2.5   Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.

5.2.6   Do not touch the display area with bare hands , this will stain the display area.

5.2.7   Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.

5.2.8   To control temperature and time of soldering is 320±10□and 3-5 sec.

5.2.9   To avoid liquid (include organic solvent) stained on LCM .

5.2.10   Caution!(LCM products with Capacitive Touch Panel)
Strong EMI-sources such as switch-mode power supplies (SMPS) can lead to touch malfunction (e.g. ghost-touches).
Therefore, the touch needs to be thoroughly tested inside the target application.

5.2.11   Do not let the LCD screen display static images (text, logos or pictures) for a prolonged period of time to prevent possible image burn-in.

5.3 STORAGE

5.3.1   Store the panel or module in a dark place where the temperature is 25□ ±5□ and the humidity is below 65% RH.

5.3.2   Do not place the module near organics solvents or corrosive gases.

5.3.3   Do not crush , shake , or jolt the module.

5.4 TERMS OF WARRANTY

5.4.1   Applicable warrant period
The period is within thirteen months since the date of shipping out under normal using and storage conditions.

5.4.2   Unaccepted responsibility
This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment , we cannot take responsibility if the product is used in nuclear power control equipment , aerospace equipment , fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.

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