FORTEC
ELEKTRONIK AG

OUR GLOBAL

COMPETENCE

CENTRES

APOLLO DISPLAY
TECHNOLOGIES

DISTEC

DISPLAY
TECHNOLOGY

Datasheet

Disea

NK !H$(' E DG!$%D

ÖÒËeí ËeÊ

Disea Electronics Co., LTD

DISEA Customized Display

PRODUCT SPECIFICATIONS

For Customer: _____

☐ : APPROVAL FOR SPECIFICATION

Customer Model No. _____

☐ : APPROVAL FOR SAMPLE

Module No.:___ZW-T043QPS-01P___

Date :___2017-10-14___

Table of Contents

No.	Item	Page
1	Cover Sheet(Table of Contents)	
2	Revision Record	
3	General Specifications	
4	Outline Drawing	
5	Absolute Maximum Ratings	
6	Electrical Specifications	
7	Optical Characteristics	
8	Reliability Test Items and Criteria	
9	Precautions for Use of LCD Modules	

For Customer's Acceptance:

Approved By	Comment

PREPARED	CHECKED	VERIFIED BY QA DEPT	VERIFIED BY R&D DEPT
John	Techshu		Dmjiang

2. Revision Record

Date	Rev.No.	Page	Revision Items	Prepared
2017-10-14	V0		The first release	JOHN

3. General Specifications

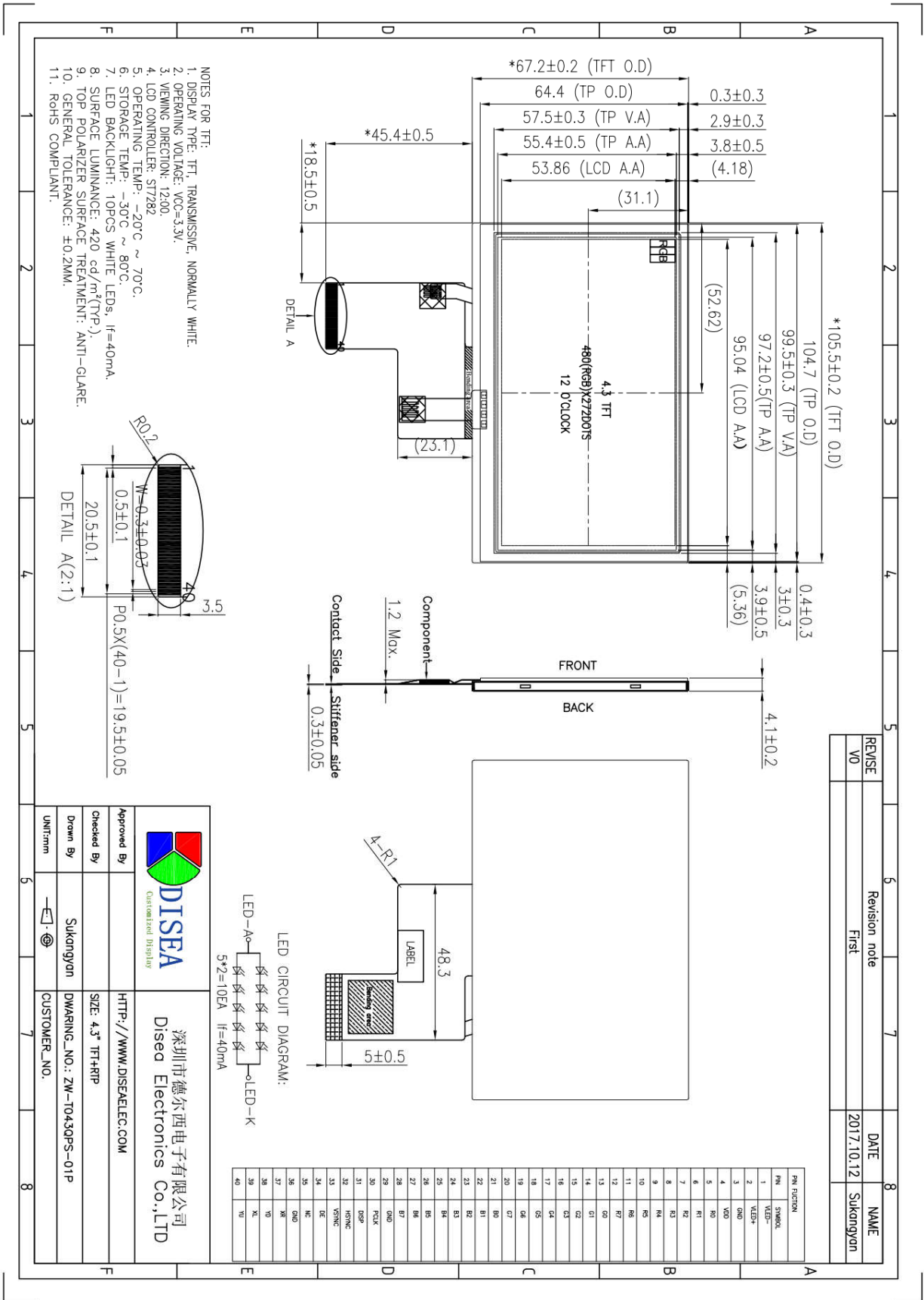*ZW-T043QPS-01P is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, RTP and a back light unit. The 4.3''display area contains 480 x 272pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion.*

Item	Contents	Unit	Note
LCD Type	TFT/Transmissive/Normally white	-	
Display color	16.7M		
Viewing Direction	12	O'Clock	
Gray inversion	6	O'Clock	
Operating temperature	-20~+70	℃	
Storage temperature	-30~+80	℃	
Module size	105.5x67.2x4.1	mm	
Active Area(W×H)	95.04X53.86	mm	
Number of Dots	480×272	dots	
Controller	ST7282	-	
Power Supply Voltage	3.3	V	
Backlight	10-LEDs (white)	pcs	
Weight	---	g	
Interface	RGB888	-	

Note 1:   Color tune is slightly changed by temperature and driving voltage.
Note 2:   Without FPC and Solder.

4.Outline Drawing

NOTES FOR TFT:
1. DISPLAY TYPE: TFT, TRANSMISSVE, NORMALLY WHITE.
2. OPERATING VOLTAGE: VCC=3.3V.
3. VIEWING DIRECTION: 12:00.
4. LCD CONTROLLER: ST7282
5. OPERATING TEMP: -20℃ ~ 70℃.
6. STORAGE TEMP: -30℃ ~ 80℃.
7. LED BACKLIGHT: 10PCS WHITE LEDs, If=40mA.
8. SURFACE LUMINANCE: 420 cd/m²(TYP.).
9. TOP POLARIZER SURFACE TREATMENT: ANTI-GLARE.
10. GENERAL TOLERANCE: ±0.2MM.
11. RoHS COMPLIANT.

深圳市德尔西电子有限公司
Disea Electronics Co.,LTD

HTTP://WWW.DISEAELEC.COM

Approved By	
Checked By	
Drawn By	Sukangyan
UNIT:mm	
SIZE: 4.3" TFT+RTP	
DWARING_NO.: ZW-T043QPS-01P	
CUSTOMER_NO.	

REVISE	Revision note	DATE	NAME
V0	First	2017.10.12	Sukangyan

LED CIRCUIT DIAGRAM:
LED-A○
5*2=10EA If=40mA
○LED-K

5. Absolute Maximum Ratings(Ta=25℃)

5.1 Electrical Absolute Maximum Ratings.(Vss=0V ,Ta=25℃)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VDD	-0.3	5.0	V	1，2

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.

2. $V_{DD} > V_{SS}$ must be maintained.

3. Please be sure users are grounded when handing LCD Module.

5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-30℃	80℃	-20℃	70℃	1,2
Humidity	-	-	-	-	3

1. The response time will become lower when operated at low temperature.

2. Background color changes slightly depending on ambient temperature.

  The phenomenon is reversible.

3. Ta<=40℃:85%RH MAX.

  Ta>=40℃:Absolute humidity must be lower than the humidity of 85%RH at 40℃.

6. Electrical Specifications

6.1 Electrical characteristics(Vss=0V ,Ta=25℃)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VDD	Ta=25℃	3.0	3.3	3.6	V	
Input voltage	'H'	V_{IH}	V_{DD}=3.3V	$0.8V_{DD}$	-	V_{DD}	V	
	'L'	V_{IL}	V_{DD}=3.3V	0	-	$0.2V_{DD}$	V	

Note:

1: Tested in 1×1 chessboard pattern.

6.2 LED backlight specification(VSS=0V ,Ta=25℃)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	Vf	If=40mA	15.0	16.0	17.5	V	
Uniformity	△Bp	If=40mA	75			%	
Life Time	-	If=40mA	30K	50K		hours	1
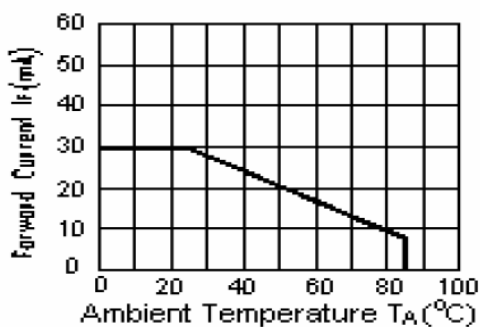
6.3 Interface signals

Pin No.	Symbol	I/O	Function
1	VLED-	P	LED back light(Cathode)
2	VLED+	P	LED back light(Anode)
3	GND	P	Ground.
4	VDD	P	Power supply
5-12	R0~R7	I	Red data bus
13-20	G0~G7	I	Green data bus
21-28	B0~B7	I	Blue data bus
29	GND		Ground.
30	PCLK	I	Data clock
31	DISP	I	Nomal diplay and Standby mode select pin
32	HSYNC	I	Line sync signal
33	VSYNC	I	Frame sync signal
34	DE	I	Data enable pin
35	NC		No connection.
36	GND	P	Ground.
37	XR	O	X_Right
38	YD	O	Y_Down
39	XL	O	X_Left
40	YU	O	Y_Up

6.4 AC Characteristics

6.4.1 Parallel 24-bit RGB Timing Table

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	8	9	12	MHz	
DCLK Period		Tclk	83	111	125	ns	
HSYNC	Period Time	Th	485	531	598	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H_Blanking setting
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	75	DCLK	
VSYNC	Period Time	Tv	276	292	321	H	
	Display Period	Tvdisp		272		H	
	Back Porch	Tvbp	2	12	12	H	By V_Blanking setting
	Front Porch	Tvfp	2	8	37	H	
	Pulse Width	Tvw	2	4	37	H	

Note: It is necessary to keep Tvbp =12 and Thbp =43 in sync mode. DE mode is unnecessary to keep it.

6.4.2 SYNC-DE Mode Timing Diagram
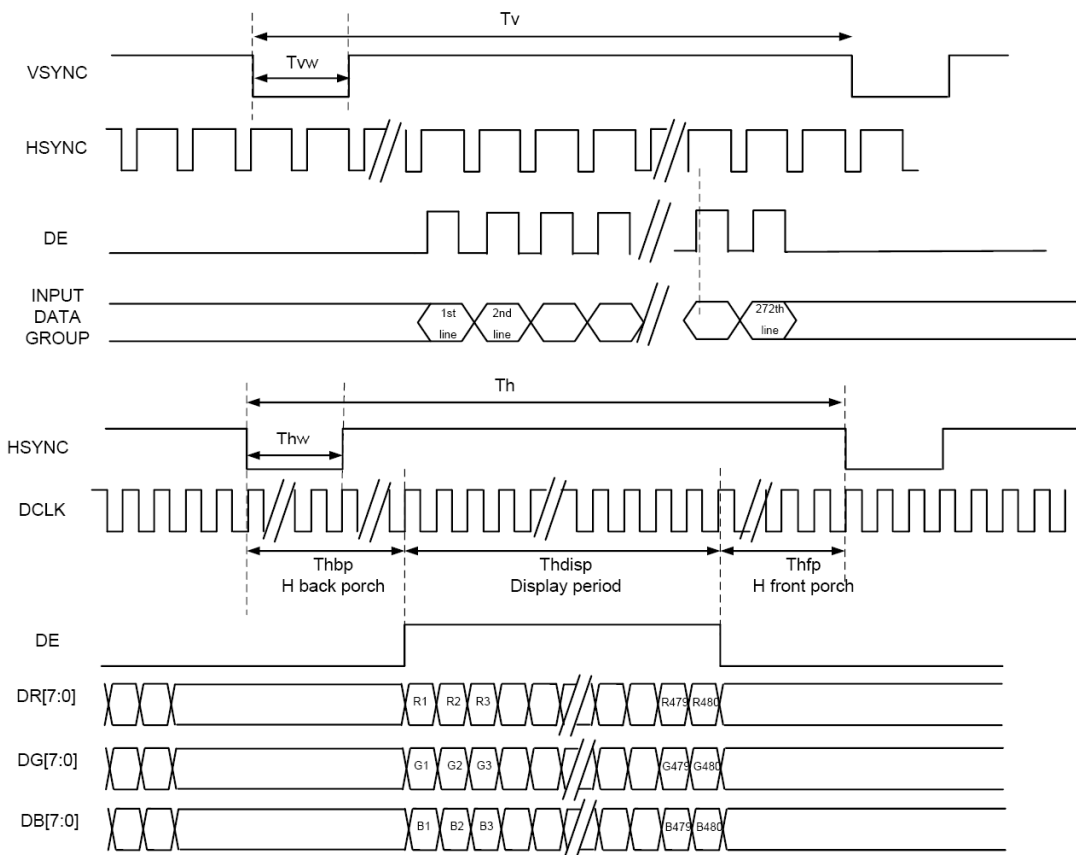
7. Optical Characteristics

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp		θ=0° Φ=0°	350	420	-	Cd/m²	1
Uniformity	△Bp			75	-	-	%	1,2
Viewing Angle	3:00		Cr≥10	55	65	-	Deg	3
	6:00			45	55	-		
	9:00			55	65	-		
	12:00			55	65	-		
Contrast Ratio	Cr		θ=0° Φ=0°	350	500		-	4
Response Time	T_r+T_f			-	25	35	ms	5
				-			ms	
Color of CIE Coordinate	W	x	θ=0° Φ=0°	0.263	0.313	0.363	-	1,6
		y		0.293	0.343	0.353	-	
	R	x		0.568	0.618	0.668	-	
		y		0.256	0.306	0.356	-	
	G	x		0.256	0.306	0.356	-	
		y		0.477	0.527	0.577	-	
	B	x		0.089	0.139	0.189	-	
		y		0.048	0.098	0.148	-	
NTSC Ratio	S			-	52	-	%	

Note：The parameter is slightly changed by temperature, driving voltage and materiel

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment BM-7 (Φ5mm)

Measuring condition:
- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25 ℃.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.
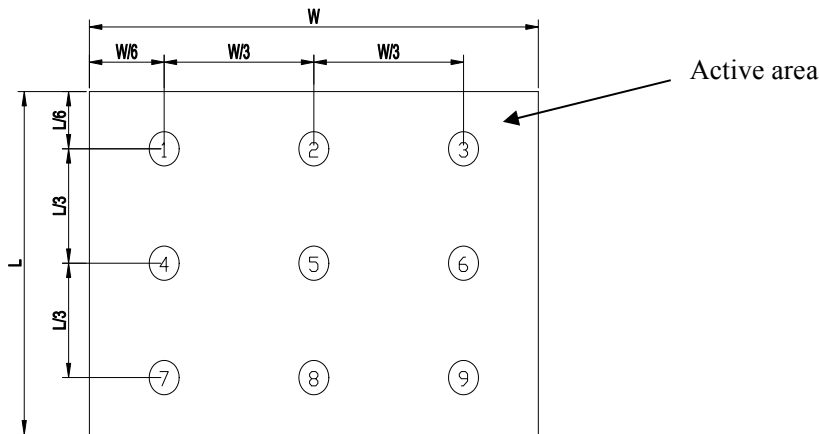
50cm → Detecter
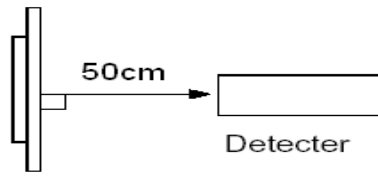
Note 2: The luminance uniformity is calculated by using following formula.

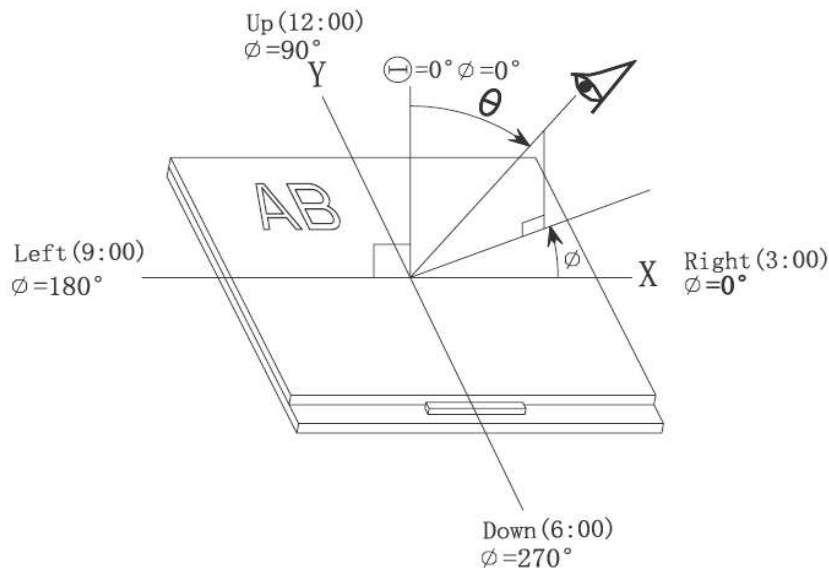$\angle Bp = Bp \text{ (Min.)} / Bp \text{ (Max.)} \times 100 \text{ (\%)}$

    Bp (Max.) = Maximum brightness in 9 measured spots

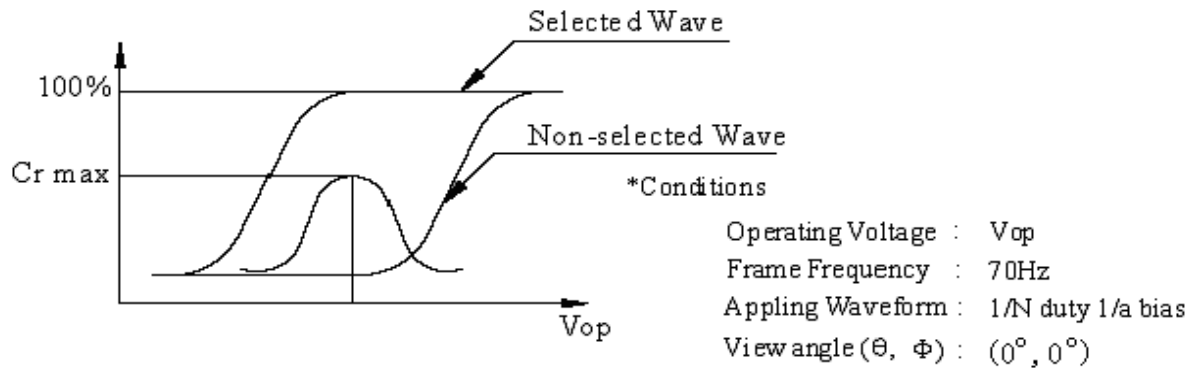   *Bp (Min.) = Minimum brightness in 9 measured spots.*

Active area

Note 3: The definition of viewing angle:

    Refer to the graph below marked by ϑ and Φ

Note 4: Definition of contrast ratio.(Test LCD using DMS501)

Selected Wave

Non-selected Wave

100%

Cr max

Vop

*Conditions

Operating Voltage : Vop
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias
View angle (Θ, Φ) : (0°, 0°)

$$Contrast\ ratio(Cr) = \frac{Brightness\ of\ selected\ dots}{Brightness\ of\ non-selected\ dots}$$

Note 5: Definition of Response time. (Test LCD using DMS501):

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.

100%
90%

10%

T_r T_f
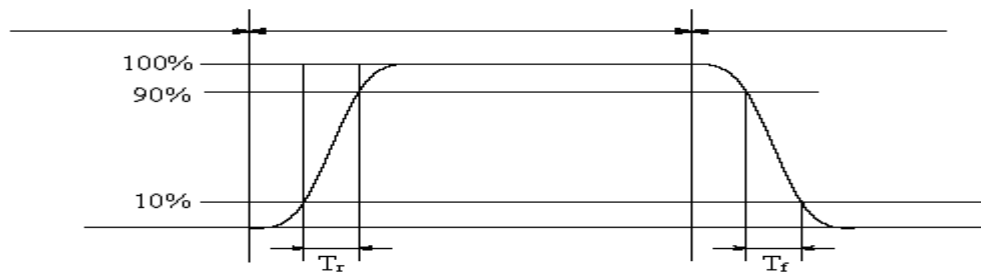
The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.

y

520
530
540
550
560
570
580
590
600
610
630
680
510
500
490
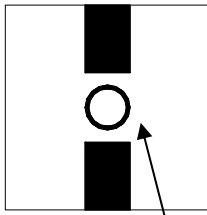470
460
420

NTSC

G

R

B

x

0

1931 CIE Chromaticity Diagram
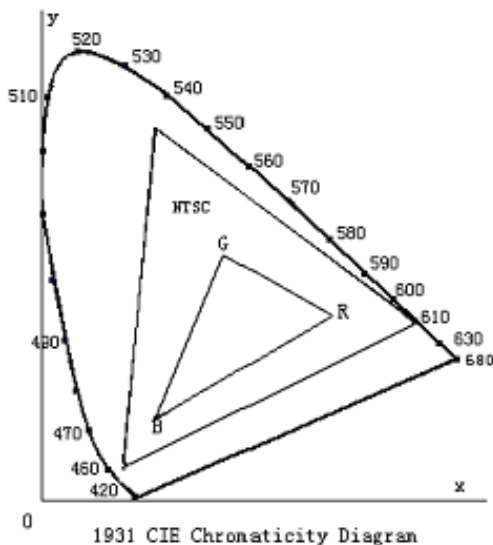
Color gamut:

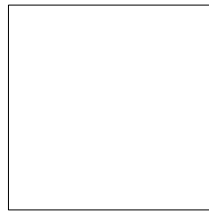$$S = \frac{area\ of\ RGB\ triangle}{area\ of\ NTSC\ triangle} \times 100\%$$

Note 7: Definition of cross talk.

*Cross talk ratio(%)=|pattern A Brightness-pattern B Brightness|/pattern A Brightness*100*

Pattern A   Pattern B

Measurement point(center)

Electric volume value=3F+/-3Hex

8. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80℃±2℃ 96H Restore 2H at 25℃ Power off	1. After testing, cosmetic and electrical defects should not happen. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-30℃±2℃ 96H Restore 2H at 25℃ Power off	
3	High Temperature Operation	70℃±2℃ 96H Restore 2H at 25℃ Power on	
4	Low Temperature Operation	-20℃±2℃ 96H Restore 4H at 25℃ Power on	
5	High Temperature/Humidity Storage	60℃±2℃ 90%RH 96H Power off	
6	Temperature Cycle	-30℃ ———— 80℃ after 5 cycle, Restore 2H at 25℃ 30min 5min 30min Power off	
7	Vibration Test	10Hz~150Hz, 100m/s2, 120min	Not allowed cosmetic and electrical defects.
8	Shock Test	Half- sine wave,300m/s2,11ms	

Note: Operation: Supply 3.3V for logic system.

The inspection terms after reliability test, as below

ITEM	Inspection
Contrast	CR>50%
IDD	IDD<200%
Brightness	Brightness>60%
Color Tone	Color Tone+/-0,05

9. *Precautions for Use of LCD Modules*

9.1 Handling Precautions

9.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

9.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

9.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

9.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

9.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

   — Isopropyl alcohol   — Ethyl alcohol

   Solvents other than those mentioned above may damage the polarizer.   Especially, do not use the following:

   — Water   — Ketone   — Aromatic solvents

9.1.6 Do not attempt to disassemble the LCD Module.

9.1.7 If the logic circuit power is off, do not apply the input signals.

9.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

   a. Be sure to ground the body when handling the LCD Modules.

   b. Tools required for assembly, such as soldering irons, must be properly ground.

   c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

   d. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

9.2 Storage precautions

9.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

9.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature :   0℃ ～ 40℃

Relatively humidity: ≤80%

9.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

9.3 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

END

FORTEC
ELEKTRONIK AG

Our company network supports you worldwide with offices in Germany, Austria, Switzerland, the UK and the USA. For more information please contact:

Headquarters

Germany

FORTEC
ELEKTRONIK AG

FORTEC Elektronik AG
Augsburger Str. 2b
82110 Germering

Phone: +49 89 894450-0
E-Mail: info@fortecag.de
Internet: www.fortecag.de

Fortec Group Members

Austria

DISTEC
A **FORTEC** GROUP MEMBER

Distec GmbH Office Vienna
Nuschinggasse 12
1230 Wien

Phone: +43 1 8673492-0
E-Mail: info@distec.de
Internet: www.distec.de

Germany

DISTEC
A **FORTEC** GROUP MEMBER

Distec GmbH
Augsburger Str. 2b
82110 Germering

Phone: +49 89 894363-0
E-Mail: info@distec.de
Internet: www.distec.de

Switzerland

ALTRAC
A **FORTEC** GROUP MEMBER

ALTRAC AG
Bahnhofstraße 3
5436 Würenlos

Phone: +41 44 7446111
E-Mail: info@altrac.ch
Internet: www.altrac.ch

United Kingdom

DISPLAY TECHNOLOGY
A **FORTEC** GROUP MEMBER

Display Technology Ltd.
Osprey House, 1 Osprey Court
Hichingbrooke Business Park
Huntingdon, Cambridgeshire, PE29 6FN

Phone: +44 1480 411600
E-Mail: info@displaytechnology.co.uk
Internet: www. displaytechnology.co.uk

USA

APOLLO DISPLAY TECHNOLOGIES
A **FORTEC** GROUP MEMBER

Apollo Display Technologies, Corp.
87 Raynor Avenue,
Unit 1Ronkonkoma,
NY 11779

Phone: +1 631 5804360
E-Mail: info@apollodisplays.com
Internet: www.apollodisplays.com