Crystalfontz America, Inc.

LCD MODULE SPECIFICATIONS

Crystalfontz Model Number	CFAX12864U1-TFH-TS
Hardware Version	
Data Sheet Version:	*Preliminary Draft*
Product Pages	
Customer Name	

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1. Module Classification Information

CFA X 12864 CP1－TFH－ * － TS

❶ ❷ ❸ ❹ ❺❻❼ ❽ ❾

❶	Brand: CRYSTALFONTZ AMERICA, INCORPORATED		
❷	Display Type: H→Character Type, G→Graphic Type, **X→TAB**		
❸	Display's Logical Dimensions: **128** pixels by **64** pixels		
❹	Model Serial No. **CP1**		
❹	Backlight Type:	N→Without backlight	A→LED, Amber
		B→EL, Blue green	R→LED, Red
		D→EL, Green	O→LED, Orange
		W→EL, White	G→LED, Green
		F→CCFL, White	**T→LED, White**
		Y→LED, Yellow Green	
❻	LCD Mode:	B→TN Positive, Gray	T→FSTN Negative
		N→TN Negative,	
		G→STN Positive, Gray	
		Y→STN Positive, Yellow Green	
		M→STN Negative, Blue	
		F→FSTN Positive	
❼	LCD Polarizer Type/ Temperature range/ View direction	A→Reflective, N.T, 6:00	**H→Transflective, W.T,6:00**
		D→Reflective, N.T, 12:00	K→Transflective, W.T,12:00
		G→Reflective, W. T, 6:00	C→Transmissive, N.T,6:00
		J→Reflective, W. T, 12:00	F→Transmissive, N.T,12:00
		B→Transflective, N.T,6:00	I→Transmissive, W. T, 6:00
		E→Transflective, N.T.12:00	L→Transmissive, W.T,12:00
❽	Special Code:	***→May have additional manufacturer's codes at this location**	
❾	Special Code:	**TS→Touch Screen**	

2. Precautions

1. Avoid applying excessive shocks to the module or making any alterations or modifications to it.
2. Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD module.
3. Don't disassemble the LCM.
4. Don't operate it above the absolute maximum rating.
5. Don't drop, bend or twist LCM.
6. Solder only to the I/O terminals.
7. Please store in anti-static electricity container and clean environment.

3. General Specifications

Item	Dimension	Unit
Number of Characters	128 x 64	–
Module dimension	63.5 x 83.7 x 6.4(MAX)	mm
View area	52.0x 33.5	mm
Active area	47.34x 26.86	mm
Dot size	0.35 x 0.4	mm
Dot pitch	0.37 x 0.42	mm
LCD type	FSTN Positive, Transflective,	
Duty	1/64	
View direction	6 o'clock	
Backlight Type	LED white	

4. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20°C		+70°C	°C
Storage Temperature	TST	-30°C		+80°C	°C
Input Voltage	VI	VSS		VDD	V
Supply Voltage For Logic	VDD-VSS	2.4		3.6	V
Supply Voltage For LCD	VO-VSS	4.0		15.0	V

5. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	VDD-VSS		2.4	2.7	3.0	V
Supply Voltage For LCD	VDD-V0	Ta=-20°C			10.5	V
		Ta=25°C		8.4		V
		Ta=+70°C	6.8			V
Input High Volt.	VIH		0.8 VDD		VDD	V
Input Low Volt.	VIL				0.2VDD	V
Output High Volt.	VOH		VDD -0.4			V
Output Low Volt.	VOL				0.4	V
Supply Current	IDD	VDD=3.3	0.8	1.0	1.2	mA

6.Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	(V)θ	CR≥3	30		60	deg
	(H)φ	CR≥3	-45		45	deg
Contrast Ratio	CR			5		
Response Time	T rise			150	200	ms
	T fall			150	200	ms

Optical Definitions

View Angle

Z (Visual angle direction)

X -φ

Y θ
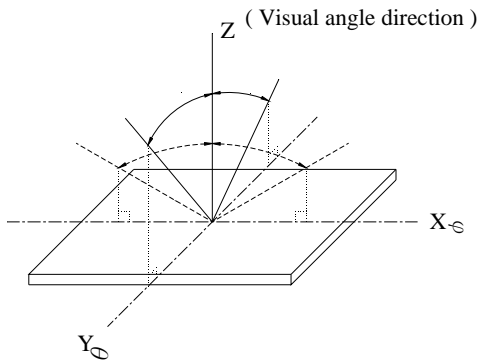
Contrast Ratio

$$CR = \frac{\text{Brightness at selected state (BS)}}{\text{Brightness at non-selected state (Bns)}}$$

Selected state

Non-selected state

Brightness (%)

Bs

Bns

Operating voltage for LCD driving

Response Time

Nonselected Condition   Selected Condition   Nonselected Condition

Brightness

100 %

10 %

90 %

tr

Rise Time

td

Decay Time (fall time tf)
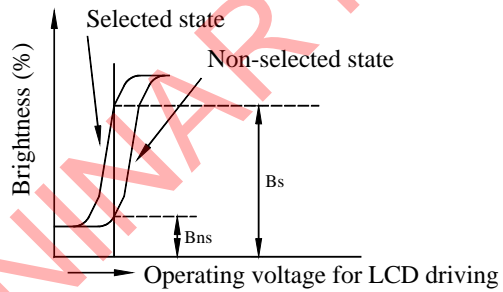
7.Interface Description

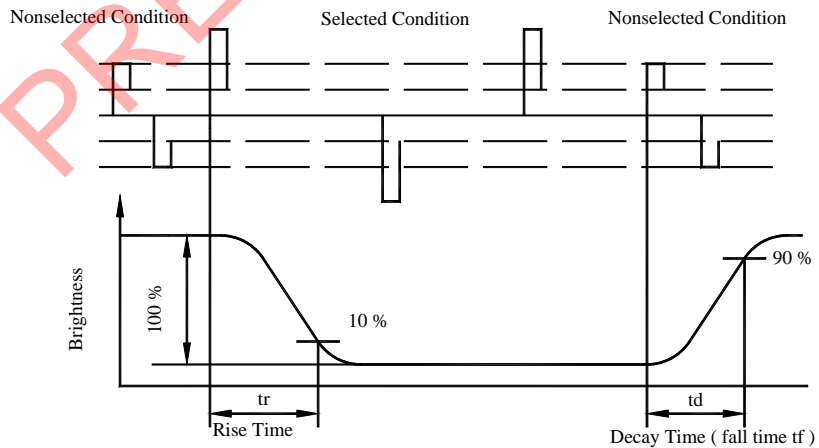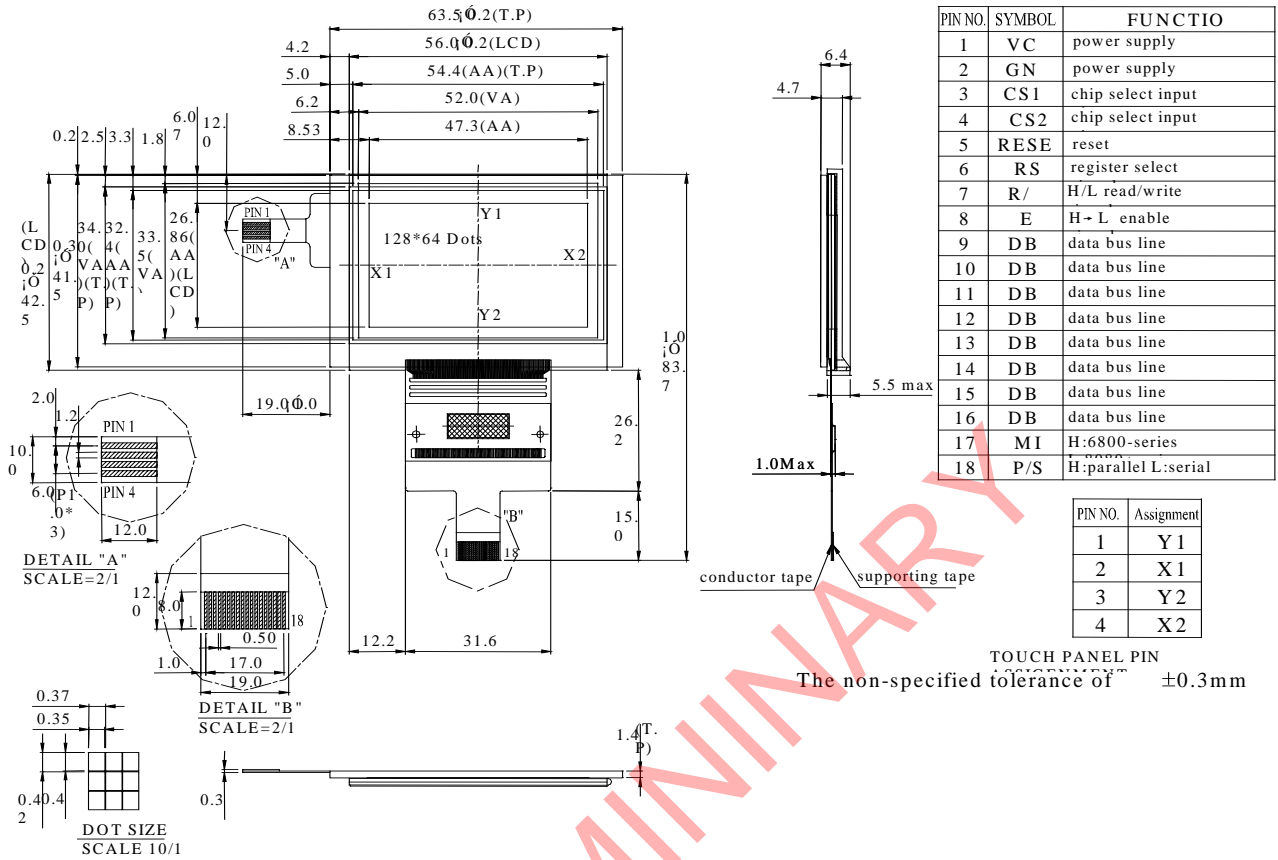| Pin	Symbol	I/O	Description
1	VDD	-	Power supply pin for logic.
2	VSS	-	Ground pin, connected to 0V
3	CS1B	I	Chip select input pins Data/instruction i/o is enabled only when CS1Bis"L"and CS2"H". When chip select is non-active,DB0 TO DB7 may be high impedance.
4	CS2	I	Chip select input pins Data/instruction i/o is enabled only when CS1Bis"L"and CS2"H". When chip select is non-active,DB0 TO DB7 may be high impedance.
5	RES	I	Reset input pin When RESETB is "L", initialization is executed.
6	RS	I	Register select input pin -RS = "H":DB0 to DB7 are display data -RS = "L" :DB0 to DB7 are control data
7	R/W	I	When connected to 80-family MPU: Write enable clock input pin. The data ON DB0~DB7 are latched at the rising edge of the /WR signal. When connected to 68-family MPU: RW = "H": read RW = "L": write
8	E	I	When connected to 80-family MPU: Read enable clock input pin. When /RD is "L", DB0~DB7 are in an output status When connected to 68-family MPU: RW = "H": When E is "H", DB0~DB7 are in an output status RW = "L": The data on DB0~DB7 are latched at the falling edge of the E signal
9~16	DB0~DB7	I/O	8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus. When the serial interface selected(PS="L") DB0~DB5: high impedance DB6: serial input clock (SCLK) DB7: serial input data (SID) When chip select is not active, DB0~DB7 may be high impedance.
17	MI	I	Microprocessor interface selects pin. MI="H": 6800-series MPU interface MI="L": 8080-series MPU interface
18	PS	I	Parallel/Serial data input select pin. Interface Data Read/Write Serial clock PS="H": Parallel DB0~DB7 E_RD,RW_WR - PS="L": Serial SID(DB7) Write only SCLK(DB6) In serial mode, it is impossible to read data from the on-chip RAM. And DB0 to DB5 are high impedance and E_RD and RW_WR must be fixed to either "H" or "L".

PIN NO.	SYMBOL	FUNCTIO
1	VC	power supply
2	GN	power supply
3	CS1	chip select input
4	CS2	chip select input
5	RESE	reset
6	RS	register select
7	R/	H/L read/write
8	E	H→L enable
9	DB	data bus line
10	DB	data bus line
11	DB	data bus line
12	DB	data bus line
13	DB	data bus line
14	DB	data bus line
15	DB	data bus line
16	DB	data bus line
17	MI	H:6800-series
18	P/S	H:parallel L:serial

PIN NO.	Assignment
1	Y1
2	X1
3	Y2
4	X2

TOUCH PANEL PIN

The non-specified tolerance of ±0.3mm

63.5±0.2(T.P)
56.0±0.2(LCD)
54.4(AA)(T.P)
52.0(VA)
47.3(AA)

6.4
4.7

4.2
5.0
6.2
8.53

0.2 2.5 3.3 1.8 6.07 12.0

Y1
128*64 Dots
X2
X1
Y2

PIN 1
PIN 4
"A"

(LCD ±0.2 ±0.2 42.5)
41.5
34.30(VA)(T.P)
32.4(AA)(T.P)
33.5(VA)
26.86(AA)(LCD)

1.0±0.2 83.7

5.5 max

1.0Max

26.2
15.0

conductor tape   supporting tape

DETAIL "A"
SCALE=2/1

2.0
1.2
PIN 1
10.0
6.0P1.0*3)
PIN 4
12.0

19.0±0.0

26.2
15.0

12.2   31.6

"B"
1   18

DETAIL "B"
SCALE=2/1

12.0
8.0
1   18
1.0
17.0
19.0

0.37
0.35

0.40.42

DOT SIZE
SCALE 10/1

0.3

1.4(T.P)

9. Display Control Instruction

Please consult specifications for the Novatek NT7534 controller.

10. Backlight Information

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	ILED	48	60	90	mA	V=3.5V
Supply Voltage	V	3.4	3.5	3.6	V	
Reverse Voltage	VR			5	V	
Luminous Intensity	IV	120	150		CD/M2	ILED=60mA
Life Time			50000		Hr.	ILED 60mA
Color	White					

Note: The LED of B/L is drive by current only, drive voltage is for reference only. Drive voltage can make driving current under safety area (current between minimum and maximum).

11. Touch Panel Information

1. General

    1.1 This document includes the specification of PN4-025F-01N

        touch screen.

    1.2 This touch screen is 4 wires analog resistive type.

    1.3 It is based on one ITO glass sheet with one layer of ITO PET on

        top.

    1.4 The PET is coated with ITO and is separated with printed   spacers.

    1.5 It is designed to be activated by pressure of finger or stylus.

2. Environment

    2.1 Storing Environment

        Temperature Range: -20°C - 70°C

        Humidity Range: 10% RH - 90% RH

    2.2 Operating Environment

        Temperature Range: 0°C - 50°C

        Humidity Range: 20% RH - 80% RH

2.3 The above environment is under normal pressure of the atmosphere.

3. Mechanical Specification

    3.1 Touch panel style

        style : Analog resistance

    3.2 Dimension Specifications:

    Dimension Outline   63.50 ±0.3 x 41.50 ±0.3

    Viewable area   56.70 x 35.00

    Active area   54.40 x 32.40   unit：mm

    PET thickness   max. 200μm

    Glass thickness   1.1

3.3 Dot Spacer Specifications：

    (1) Diameter: 0.05 mm ± 0.01 mm

    (2) Height: 5 um - 10 um

    (3) Pitch: 3 mm

    (4) Pattern: rhombus

    (5) Operative Force : ≈ 40g

    3.4 Surface Hardness PET ≈ 3H

    3.5 Transparency

    Non-Glare Panel : 70 % , Wave length at 450~700nm

4. Electrical Specification

Film resistance between leads   150Ω - 1300Ω

Glass resistance between leads 150Ω - 1300Ω

Operative resistance : 2KΩ

Linearity deviation : 2.0%

Insulation resistance   : 20MΩ/25V.

(The ON Resistance is measured when the panel is pressed by

R8 , HS60 silicon rubber at 80 g force).

5. Quality Standard

5.1 Resistance against chemicals
The panel could be cleaned with cloth containing ethanol or
neutral cleaner. It is no effects to the characteristics.

5.2 Dirt and Flaws on Panel Surface
The flaws and Impurities are allowed outside viewing area
except those affecting electrical functions.
Inside the viewing area , it meets the following :

5.3 Within viewable area (PANEL) :

(1) Hair Flaws :

W   0.05 mm，L   12 mm OK

0.05 mm ＜ W   0.1 mm，L   5 mm 3 or less for ok

W ＞ 0.1 mm , L ＞ 2 mm No good

(W : width of flaws , L : length of flaws)

(2) Dot-shaped Impurities :

D   0.1 mm OK

0.1 mm ＜ D   0.3 mm 5 or less for ok

D ＞ 0.3 mm No good

(D : average of diameter)

(3) Scratch :

W   0.05 mm，L   12 mm OK

0.05 mm ＜ W   0.1 mm，L   12 mm 5 or less for ok

W ＞ 0.1 mm，L ＞ 12 mm No good

(W : width of scratch , L : length of scratch)

5.4 Glass Sheet

(1) Glass Sheet Cracks and Chips : No Cracks and Chips on the Glass Sheet.

(2) The angle chips are smaller than 2.5 mm ＊2.5 mm ＊1.1   mm (X ＊ Y ＊ Z)

(3) The border chips are smaller than 5 mm ＊2 mm ＊1.1 mm

(X ＊ Y ＊ Z)

X : Width direction against the edge line.

Y : Length direction against the edge line.

Z : Thickness direction against the edge line.

The chips are not supposed to affect any of the electrical functions.

6. Durability

Keystroke Durability

No damages or malfunctions should occur after 1,000,000 keystrokes as the following :

   Keystroke element : R8 , HS40 silicon rubber

   Keystroke load : 150 g

   Keystroke speed : 0.33 sec/stroke

   Keystroke position : Any position in active area

   Temperature and humidity : Normal

7. Reliability

   7.1 High temperature test

   After putting panels at 60°C for 120 hours , they meet the electrical

   specification required in section 4.

   7.2 Low temperature test

   After putting panels at -20°C for 120 hours , they meet the electrical

   specification required in section 4.

   7.3 Temperature and humidity test

   After putting panels at 60°C , 90% RH for 120 hours , they meet the electrical specification required in section

4.

   7.4 Thermal shock test

   1 Cycle : -20°C →70°C (30 minutes period)

   After putting panels for 10 cycles within 24 hours , they meet the

   electrical specification required in section 4.

8. Inspection Method

   8.1 PET

      (1) Linearity

   Voltage (DC 5V) is applied to X1 or Y1 and GND to X2 or Y2

   By using stylus to cross direct line for every 5 mm step within

   active area to detect the voltage at Y1 or X1

   To measure the voltage difference between X1 and X2 or Y1 and

   Y2

   The voltage variance ＝ Ex or Ey

   The linearity must meet the riquirement of section 4

      (2) Appearance : The inspection shall be performed by using one

         17w fluorescent lamp as back or side light . The panel shall be

         placed at 30cm away from eyes. The panel must meet the

         requirement of section 5.

8.2 Glass

    (1) Linearity : refer to 8.1-(1)

    (2) Strength : By using a 9mm diameter steel ball to fall on the
       panel with height of 30cm , the panel will not be broken.

    (3) Appearance : refer to 8.1-(2)

 8.3 Tail Bending : By bending the tail 90° around a 2mm cylinder for
     3 times , the panels meet the requirement of section 4.

9. Cautions

  9.1 The bezel which contacts with PET film should keep a distance at
     least 3 mm from the active area to avoid short.

  9.2 The bezel which contacts with PET film should not place heavy
     pressure on the film and the surface of bezel should be kept
     smooth.

  9.3 Please keep clean on the surface of PET film , Don't attach any
     tape on that.

  9.4 Neither pull tail upward nor push downward with an angle of 90°
     It should keep an arch at least R5.

  9.5 If there exist any high voltage power , please make an adequate
     protect.

  9.6 To avoid the high voltage static power to damage panel , please
     don't operate touch panel without connecting controller.

  9.7 Retain the right of changing the materials with same grade
     and specification.