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NEC

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TFT COLOR LCD MODULE

Type No. NL10276BC26-09

34cm (13. 8 Type) . XGA

LVDS interface

SPECIFICATIONS
First Edition

DATA SHEET

NEC Corporation
Display Device Operations Unit
Color LCD Division
Application Engineering Department

Approved		Apr. 1, 1998
Checked		Apr. 1, 1998
Prepared	J. Kusanagi	Apr. 1, 1998

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5. OUTLINE OF CHARACTERISTICS (at room temperature)

Display area	270 34(H) × 202.75(V) mm
Drive system	a-Si TFT active matrix
Display colors	262144
Number of pixels	1024 × 768
Pixel arrangement	RGB vertical stripe
Pixel pitch	0.264(H) × 0.264(V) mm
Module size	297.0(H) × 218.0(V) × 8.5typ. (D) mm
Weight	635g (typ.)
Contrast ratio	120:1 (typ.)

Viewing angle (more than the contrast ratio of 10:1)
        Horizontal: 45° (typ. left side, right side)
        Vertical : 25° (typ. upper side), 35° (typ. lower side)

Designed viewing direction
        ·wider viewing angle with contrast ratio   : down side (6 o'clock)
        ·wider viewing angle without image reversal : up side (12 o'clock)
        ·optimum grayscale (r~2.2)   : perpendicular

Polarizer pencil-hardness	3H(min. at JIS K5400)
Color gamut	35%(min., center to NTSC)
Response time	20ms(typ.), "white" to "black"
Luminance	100cd/m² (typ.)
Signal system	8-bit digital signal RGB signals. Synchronous signals(Hsync. Vsync) and Dot-clock(CLK) are adapted for DS90CF561 (National Semiconductor Co. Ltd.)
Supply voltage	5.0V
Backlight	Edge light type, one cold cathode fluorescent lamp. Inverter-less
Power consumption	4.3W(typ. 100cd/m²)

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6. BLOCK DIAGRAM
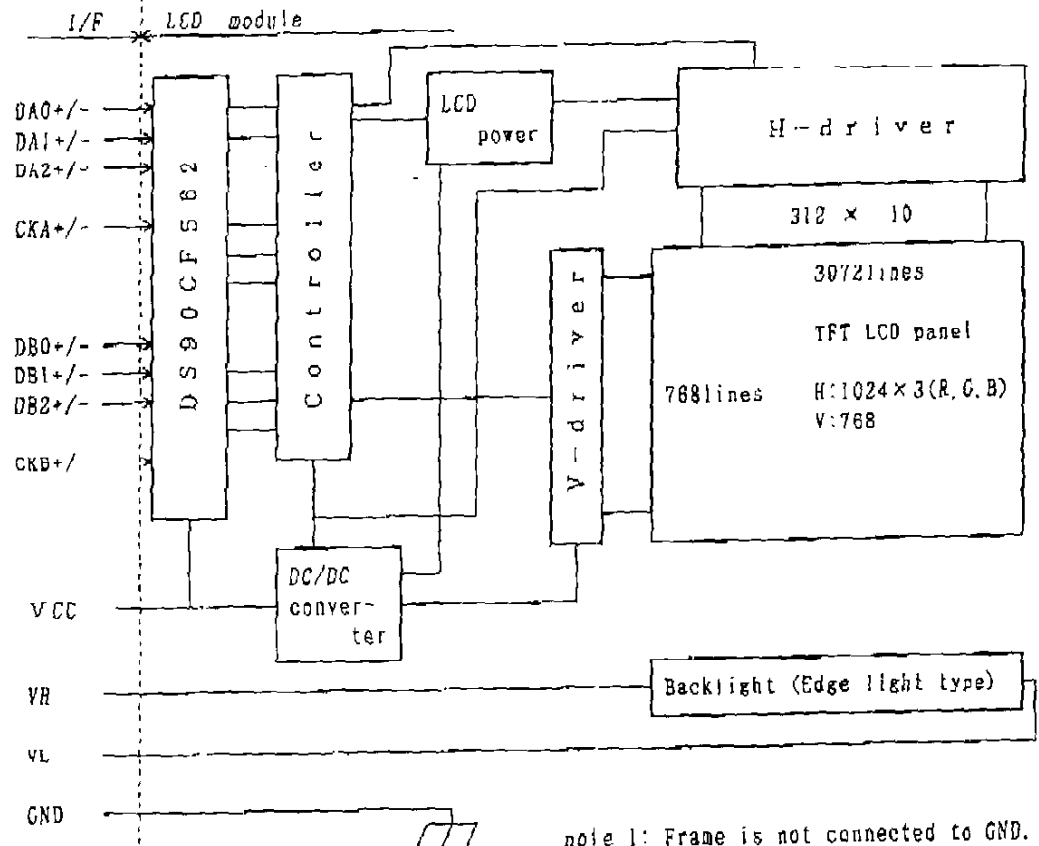
note 1: Frame is not connected to GND.

7. SPECIFICATIONS
7.1 GENERAL SPECIFICATIONS

Item	Specifications	Unit
Module size	297.0±0.5 (H) × 218.0±0.5 (V) × 9.5max.(D)	mm
Display area	270.34 (H) × 202.75 (V)	mm
Number of pixels	1024 (H) × 768 (V)	pixel
Dot pitch	0.088 (H) × 0.264 (V)	mm
Pixel pitch	0.264 (H) × 0.264 (V)	mm
Pixel arrangement	RGB (Red.Green.Blue) vertical stripe	-
Display colors	262.144	color
Weight	850 (max.)	g

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7.2 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit	Remarks
Supply voltage	VCC	-0.3 to +6.0	V	Ta = 25℃
Logic input voltage	VI	-0.3 to VCC+0.3	V	
Storage temp.	TST	-20 to +60	℃	—
Operating temp.	TOP	0 to +50	℃	Module surface *
Humidity (No condensation)		≤ 95% relative humidity	Ta≦40℃	
		≤ 85% relative humidity	40℃<Ta≦50℃	
		Absolute humidity shall not exceed Ta=50℃.85% relative humidity level.	Ta>50℃	

* Measured at the display area

7.3 ELECTRICAL CHARACTERISTICS
(1) Logic/ LCD driving

Ta = 25℃

Parameter	Symbol	Min.	Typ	Max.	Unit	Remarks
Supply voltage	VCC	4.75	5.0	5.25	V	—
LVDS signal input "L" voltage	VIL	-100	-	-	mV	VCM=1.2V
LVDS signal input "H" voltage	VIH	-	-	+100	mV	VCM: Common mode voltage in LVDS driver
Supply current	ICC	-	300 note 1	700	mA	VCC=5.0V

note 1: Checker flag pattern (in EIAJ ED-2522)

Ta = 25℃

(2) Backlight

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Lamp current	IL	2.0	4.5	5.9	mArms	2.0mArms:40cd/cm² typ. 3.0mArms:65cd/cm² typ. 4.5mArms:100cd/cm² typ. 5.9mArms:125cd/cm² typ.
Lamp voltage	VL	-	620	-	Vrms	620Vrms: IL=4.5mArms
Lamp turn on voltage	VS	1500 1100	- 1550	2000 2000	Vrms Vrms	Ta= 0℃ Ta=25℃
Oscillator frequency	Ft	50	60	95	KHz	-

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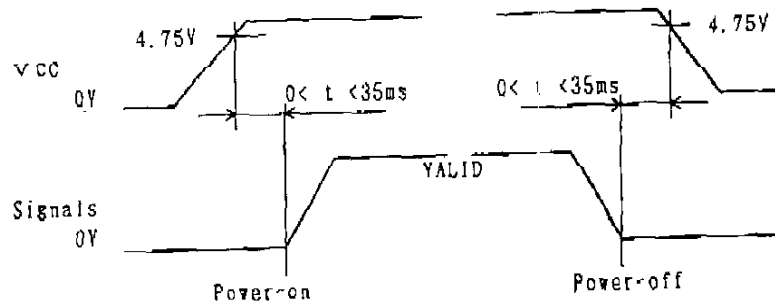note 1.　Recommended value of "Ft"
　　　　　·Ft is within the specification.
　　　　　and

$$\cdot Ft = \frac{1}{4\,th} \times (2n-1)$$

　　　　　　　　　　　　　t h: Ksync period
　　　　　　　　　　　　　n: a natural number (1,2,3,·····)

　　　　If Ft is out of the recommended value, interference between Ft frequency and
　　　　Hsync frequency may cause beat on the display.

7.4 SUPPLY VOLTAGE SEQUENCE

*1 The supply voltage for input signals should be the same as VCC.
*2 Apply VH within the LCD operation period. When the backlight turns on before LCD
　　operation or the LCD operation turns off before the backlight turns off, the display
　　may momentarily become white.
*3 When the power is off, please keep whole signals(Hsync, Vsync, CLK, DE, MODE, DATA)
　　low level or high impedance.

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7.5 INTERFACE PIN CONNECTION

(1) Interface connector for signal and power
    Part No.   : L2-20P-SL-SMT
    Adaptable socket: L2-20P-SC3
    Supplier   : Japan Aviation Electronics Industry Limited (JAE)

Pin No.	Symbol	Signal type	Function
1	CKB+	An odd number pixel clock	CLK for an odd number pixel f=32.5MHz (typ.) (LVDS level)
2	CKB-		
3	DB2+	An odd number pixel data	D1.D3.D5···D1023 pixels data (LVDS level)
4	DB2-		
5	DB1+		
6	DB1-		
7	DB0+		
8	DB0-		
9	CKA+	An even number pixel clock	CLK for an even number pixel f=32.5MHz (TYP.) (LVDS level)
10	CKA-		
11	DA2+	An even number pixel data	D0.D2.D4···D1022 pixels data (LVDS level)
12	DA2-		
13	DA1+		
14	DA1-		
15	DA0+		
16	DA0-		
17	GND	Ground	Connect system ground
18	GND		
19	V CC	+5.0V power supply	Supply +5V ± 5%
20	V CC		

(2) Connector for backlight unit
    Part No.   : BHSR-02VS-1
    Adaptable socket: SM02B-BHSS-1-TB
    Supplier   : J.S.T. TRADING COMPANY, LTD.

Pin No.	Symbol	Function
1	VH	High voltage terminal
2	VL	Low voltage terminal

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7.6 METHOD OF CONNECTION FOR DS90CF561

DS90CF561 (NS co.)　　　　　　　　　　　NL1027GBC26-09
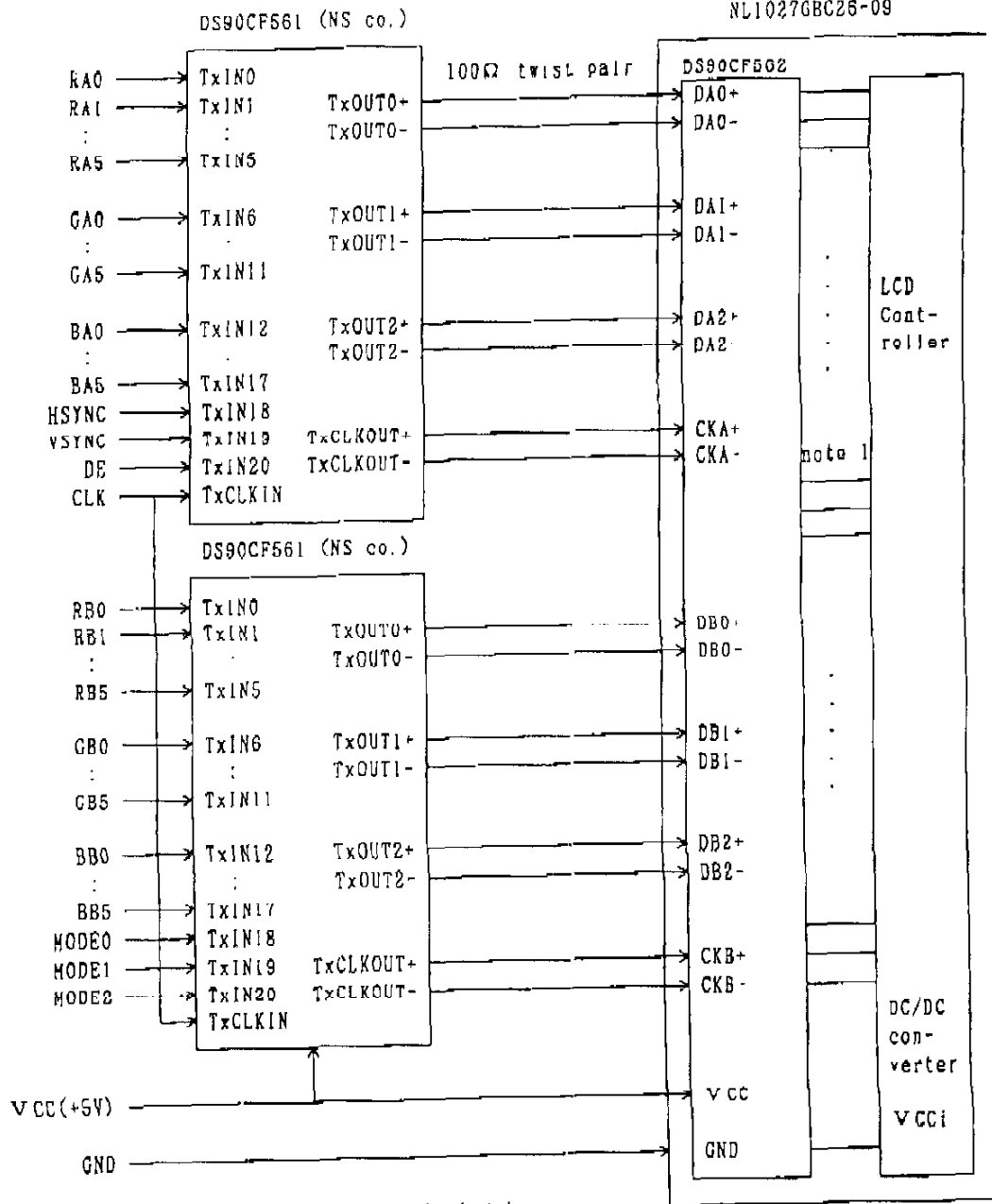
RAx. GAx. BAx : D0. 2. 4. ·····D1022 pixel data
RBx. GBx. BBx : D1. 3. 5. ·····D1023 pixel data
MODE0 : "H"
MODE1 : Mode select: "L" (DE). "H" (FIX)
MODE2 : "L"

note 1: These timing should be kept in the specified range of 7.8 INPUT SIGNAL TIMING.

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