Ordering number : EN*4804

CMOS LSI

DG24320C5PC

5.7 Inch 320 × 3 (RGB) × 240 Dots STN Color LCD Module

Preliminary

Overview

The DG24320C5PC is a thin, lightweight STN color LCD module that incorporates slim TAB drivers. It consists of an LCD panel, various ICs and other components, and can display color graphics in a 320 × 3 (RGB) × 240 dot resolution.

The data interface connects the module to its controller via 4- or 8-bit parallel connections divided into two systems for the upper and lower sections.

Applications

- Miniature data-processing equipment
- Test and measurement equipment, multi-function telephones, fish-finding equipment

Features

- Vivid color images using an STN color panel
- Thin form-factor and light weight
- Built-in high-intensity backlight

General Specifications

- Display size: 5.7 inch diagonal
- LCD drive method: 1/240 duty, 1/16 bias
- LCD specifications: STN color LCD display, transmission type, negative mode
- Color array: RGB stripe
- Display capacity: 320 × 3 (RGB) × 240 dots
- Data input method: 4-bits × 2 or 8-bits × 2, alternating drive
- Circuit structure: See the block diagram
- Backlight: Two CFL edgelights

Dimensions

- Module dimensions:
  161.5 (W) × 128.5 (H) × 12.0 (T) mm
- Effective viewing area:
  119.2 (W) × 90.4 (H) mm
- Dot pitch:
  0.12 (W) × 0.36 (H) mm
- Dot size:
  0.11 (W) × 0.35 (H) mm
- Weight:
  280 (approximately) g

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Specifications

Absolute Maximum Ratings at Ta = 25°C

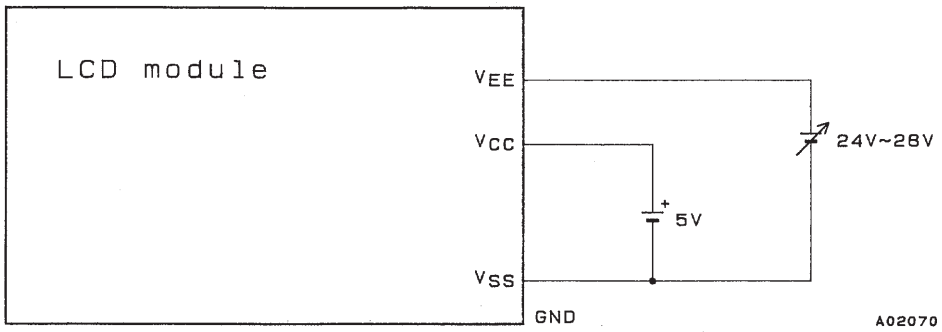
Parameter	Symbol	Conditions	Ratings	Unit
Logic supply voltage	$V_{CC} - V_{SS}$		–0.3 to +7.0	V
LCD drive supply voltage	$V_{EE} - V_{SS}$		–0.3 to +45.0	V
Input voltage	V_I		–0.3 to V_{CC} + 0.3	V
Operating temperature	Topr		0 to +40	°C
Storage temperature	Tstg		–20 to +60	°C

Electrical and Optical Characteristics at Ta = 25°C

Parameter		Symbol	Conditions	Ratings			Unit
				min	typ	max	
Input high level voltage		V_{IH}		0.8 V_{CC}		V_{CC}	V
Input low level voltage		V_{IL}		V_{SS}		0.2 V_{CC}	V
Current drain		I_{CC}	$V_{CC} - V_{SS}$ 5.0 V		10		mA
		I_{EE}	$V_{EE} - V_{SS}$ 26.0 V		15		mA
Response times	Rise time	tr	θ = 0°		200	400	ms
	Fall time	tf	θ = 0°		200	400	ms
Contrast ratio		k	θ = 0°	4	5		
Viewing angle		θ2 – θ1	K > 1	60	70		deg
LCD drive voltage (recommended voltage)*			θ = 0°		26.0		V

Note: * LCD display contrast varies greatly with the viewing angle. The value indicated here is for reference purposes only. The acceptability of the contrast should be determined by mounting a sample in an actual product.

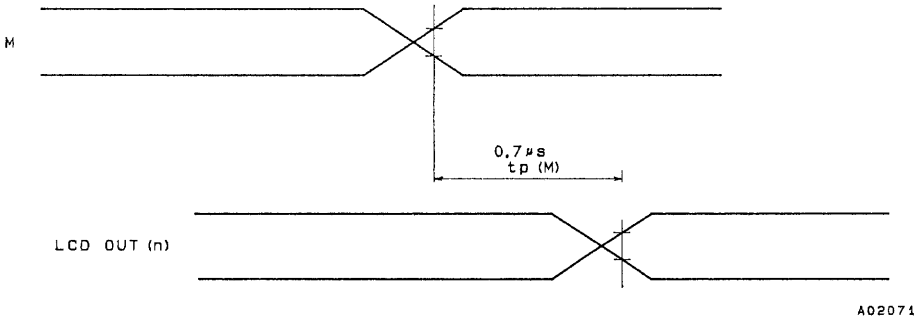
Supply Voltage Circuit Example



Note: When applying power, apply signals in the following order: first control inputs, then V_{CC}, and finally V_{EE}. When turning off the module, remove signals in the reverse order. Module internal ICs can be damaged if signals are not applied and removed in this order.

LCD AC Signal (M)

Although the DG24320C5PC module includes an LCD AC signal generation circuit, it is also possible to alternate the drive waveforms using an external LCD AC signal.
Note that the external drive waveforms without alternation should damage the LCD and cause the deterioration on display. The current must be switched within a single frame and for every frame.



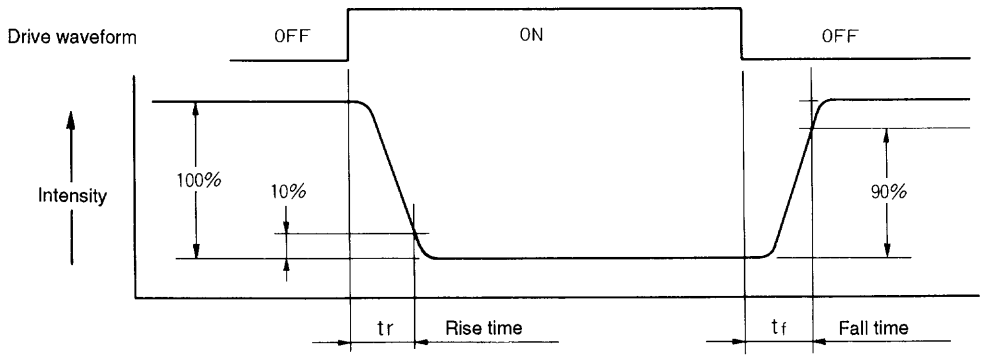


Figure 1 Response Time Definition

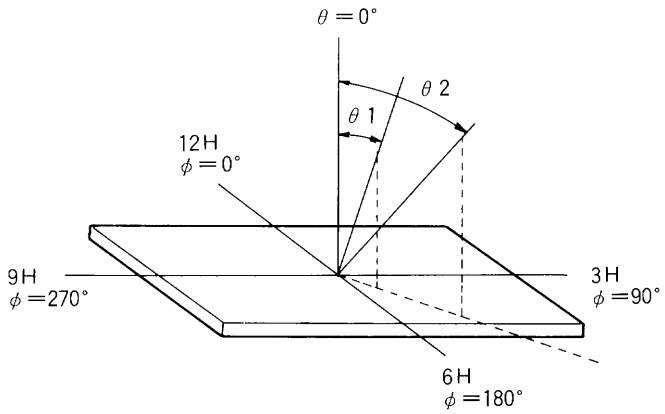


Figure 2 Definitions of the Angles θ and ø

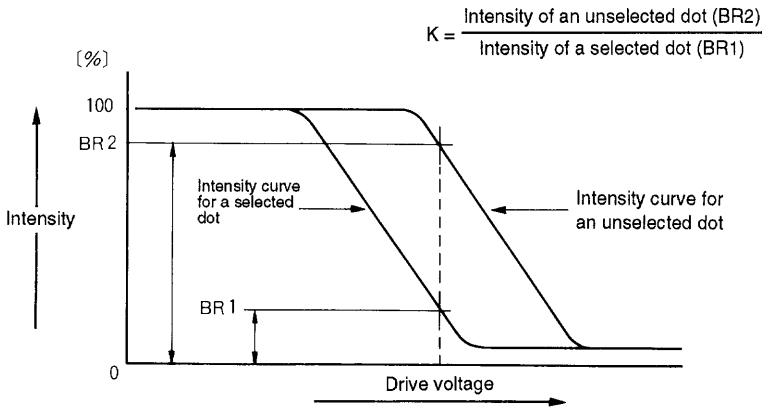
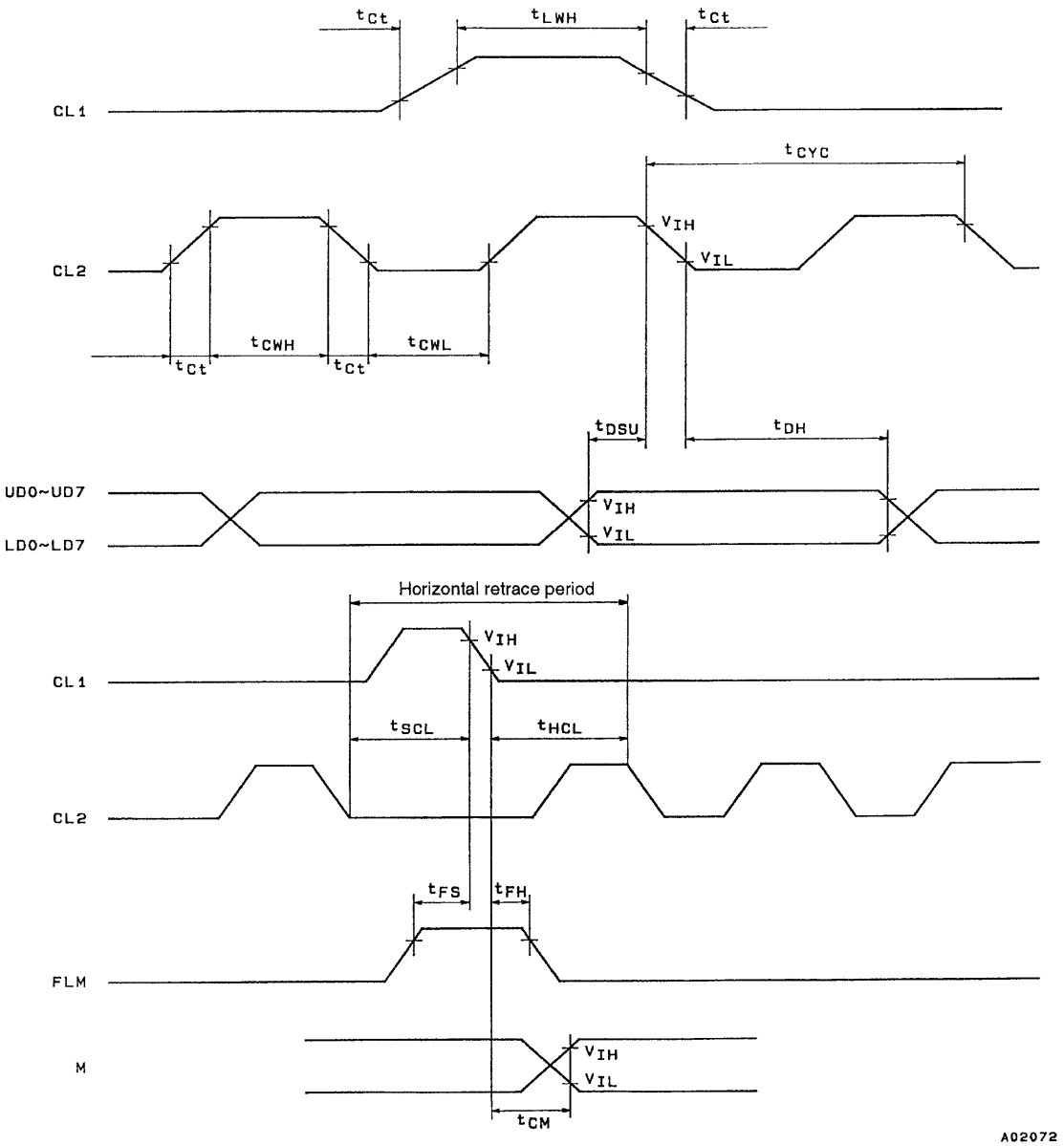


Figure 3 Contrast Definition

Timing Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Maximum CL2 frequency	t_{CYC}		82			ns
CL2 pulse width (high level)	t_{CWH}		28			ns
CL2 pulse width (low level)	t_{CWL}		28			ns
CL1 pulse width (high level)	t_{LWH}		30			ns
CL2 setup time	t_{SCL}		30			ns
CL2 hold time	t_{HCL}		200			ns
Clock rise/fall time	t_{Ct}				13	ns
Data setup time	t_{DSU}		28			ns
Data hold time	t_{DH}		20			ns
FLM setup time	t_{FS}		100			ns
FLM hold time	t_{FH}		30			ns
M delay time	t_{CM}		–300		300	ns
Frame frequency	f_{FLM}			73		Hz

Timing Charts



Interface Connections (CN-1)

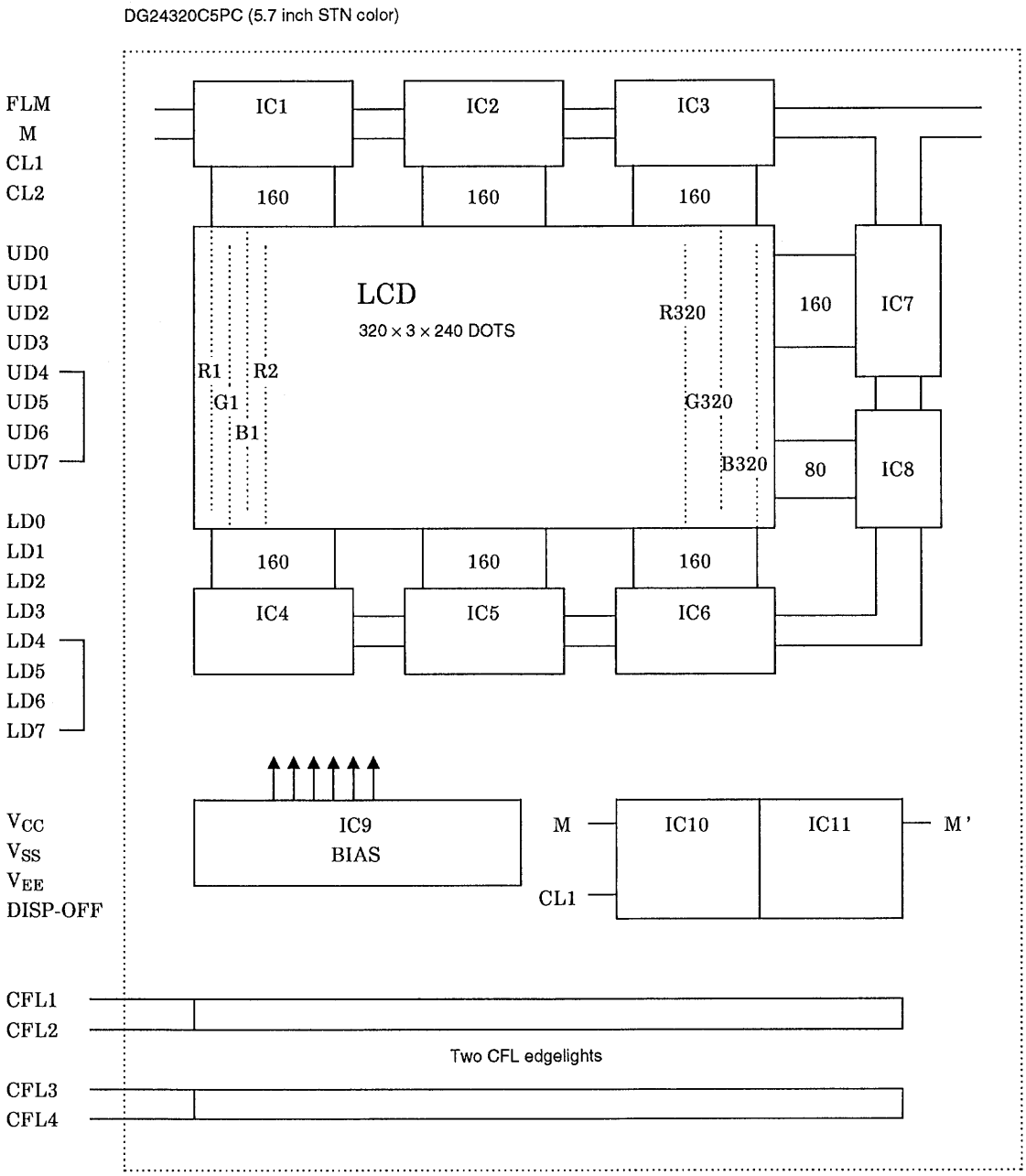
Pin No.	Symbol	Function	
1	FLM	Scan line drive synchronization signal	
2	M	LCD alternation signal	
3	CL1	Display data latch and scan line shift clock	
4	CL2	Display data shift lock	
5	UD0	Upper driver display data	R_1, G_6, B_{11}.....
6	UD1	Upper driver display data	B_1, R_7, G_{12}.....
7	UD2	Upper driver display data	G_2, B_7, R_{13}.....
8	UD3	Upper driver display data	R_3, G_8, B_{13}.....
9	UD4	Upper driver display data	B_3, R_9, G_{14}.....
10	UD5	Upper driver display data	G_4, B_9, R_{15}.....
11	UD6	Upper driver display data	R_5, G_{10}, B_{15}.....
12	UD7	Upper driver display data	B_5, R_{11}, G_{16}.....
13	LD0	Lower driver display data	G_1, B_6, R_{12}.....
14	LD1	Lower driver display data	R_2, G_7, B_{12}.....
15	LD2	Lower driver display data	B_2, R_8, G_{13}.....
16	LD3	Lower driver display data	G_3, B_8, R_{14}.....
17	LD4	Lower driver display data	R_4, G_9, B_{14}.....
18	LD5	Lower driver display data	B_4, R_{10}, G_{15}.....
19	LD6	Lower driver display data	G_5, B_{10}, R_{15}.....
20	LD7	Lower driver display data	R_6, G_{11}, B_{16}.....
21	V_{CC}	Logic drive power supply (+5 V)	
22	V_{SS}	GND	
23	V_{EE}	LCD drive power supply	
24	DISP – OFF	High: display on, low: display off	
25	NC		
26	NC		

Note: Recommended interface cables and connectors
Recommended cables : Flexible flat cable
: Manufacturer — Sumitomo Electric Industries, Ltd.
: Specifications — Sumicard (pitch: 0.8, pin count: 26)
Recommended connector: FFC connector
: Manufacturer — Burndy Japan Ltd.
: Model No. — SFR26-ISTEI

Backlight Pin Connections (CN-2)

Pin No.	Symbol	Function	Note
1	CFL1	High voltage input GND2	Recommended inverter Manufacturer — Todai Musen, Ltd. Model No. — MIU-201 Recommended inverter connector Manufacturer — Hirose Electric Co., Ltd. Model No. — DF3-6P-2H
2	CFL3	High voltage input GND1	
3	NC		
4	NC		
5	CFL2	High voltage input 2	
6	CFL4	High voltage input 1	

Block Diagram

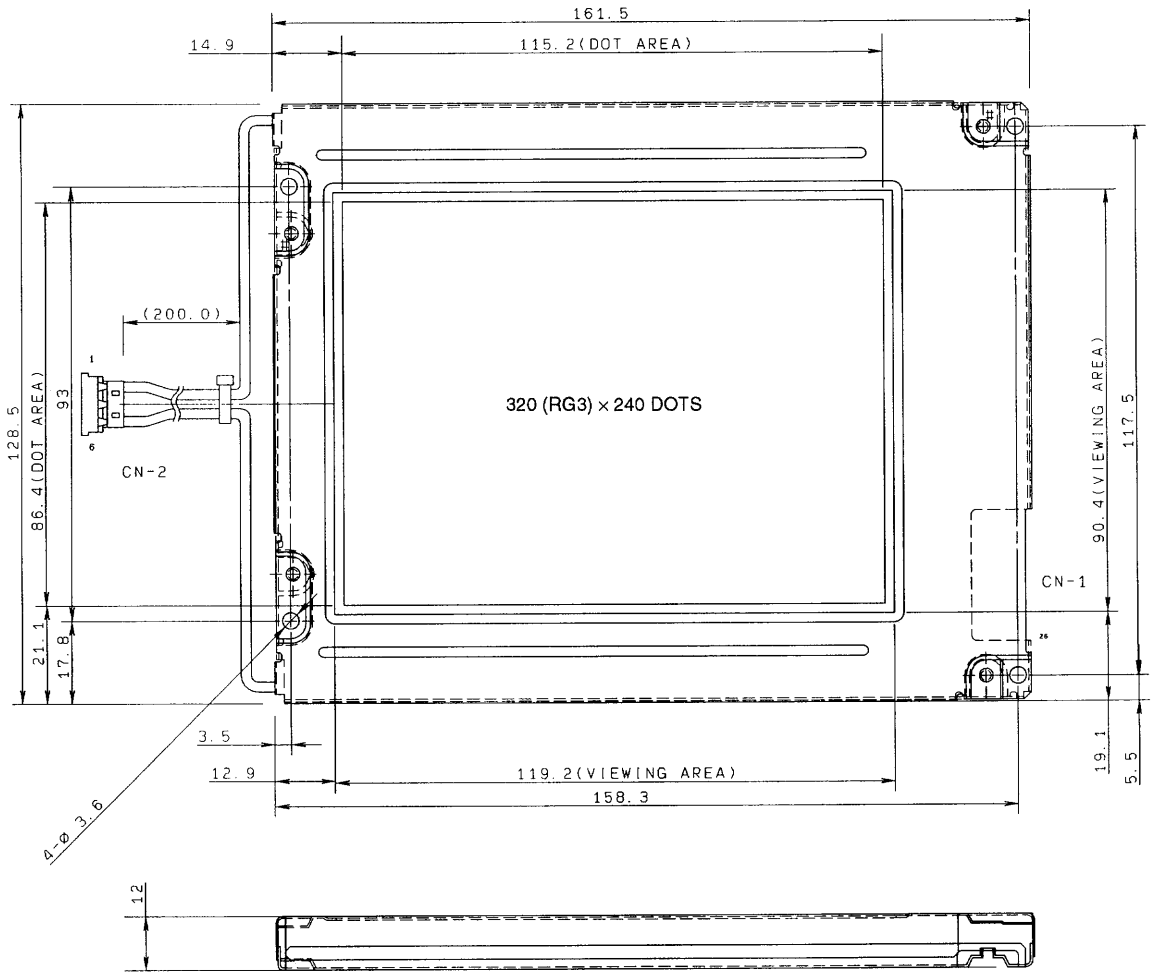


Note: 1. Two input modes, selected by a solder option, are available: an 8-bit by 2 mode that uses UD0 to UD7 and LD0 to LD7 and a 4-bit by 2 mode that uses UD0 to UD3 and LD0 to LD3.
2. Connect UD4 to UD7 and LD4 to LD7 to the V_{SS} level when using the 4-bit mode.
3. When using 4-bit mode, the data order can be changed to the regular positions by making the connections listed below for the 8 bit x 1 screen.
Connect D0, D2, D4 and D6 to UD0, UD1, UD2 and UD3 respectively.
Connect D1, D3, D5 and D7 to LD0, LD1, LD2 and LD3 respectively.

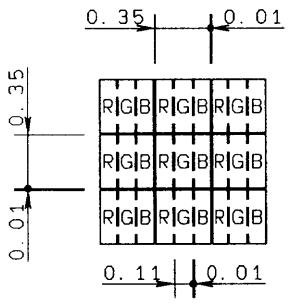
Module Dimensions 3202

unit: mm

DG24320C5PC (5.7 inch STN color)



LCD Dot Structure in Detail



CN-1 (1/F connector)
Manufacturer — Burndy Japan Ltd.
Model No. — SFR-1STEI

CN-2 (CFL connector)
Manufacturer — Hirose Electric Co., Ltd.
Model No. — DF3-6S-2C (housing)
— DF3-2428SCF (contact pin)

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