

Features:

- u Wide viewing angle STN LCD
- u CFL backlighting ensures long life
- u Extremely low power consumption

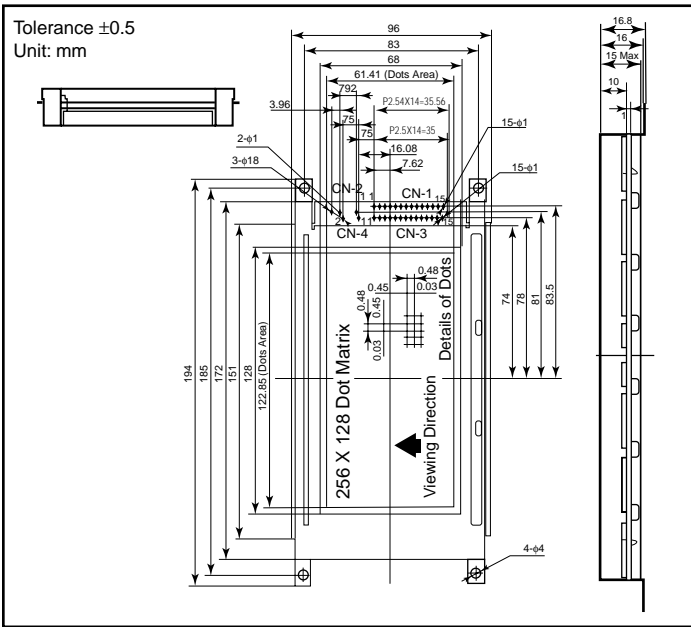
Applications:

- u Factory automation equipment
- u Programmable controller
- u Measurement equipment
 - u Security equipment
- u Office automation equipment
 - u POS terminal
 - u Health equipment

Product Specifications

Part Number	LCD Type	Viewing Direction	Module Dimensions W x H x D (mm)	Effective Viewing Area W x H (mm)	Pixel Pitch	Duty Ratio	Back Light Source	Interface
GMF25012HBTW	STN B & W	6:00	194 x 96 x 16.8	128 x 68	0.48 x 0.48	1/128	CFL	4bit parallel

1. External Dimensions



2. Absolute Maximum Ratings

2-1. Environmental Conditions

Item		Minimum	Maximum	Remarks
Ambient Temperature	Operating	0°C	+50°C	—
	Storage	-20°C	+70°C	—
Humidity		*1		No Condensation
Vibration		Conforms to JIS-C-7021A-10		Refer to 7
Mechanical Shock		Conforms to JIS-C-0041		Refer to 7
Corrosive Gas		None		—

*1 : $T_a \leq +40^\circ\text{C}$ 90%RH maximum

$T_a > +40^\circ\text{C}$ Absolute humidity should not exceed 90% RH at $T_a = 40^\circ\text{C}$

2-2. LCD Driving

($T_a = 0 \sim +50^\circ\text{C}$)

Item	Symbol	Min.	Max.	Unit	Remarks
Power Supply for Logic	VDD-VSS	0	7	V	—
Input Voltage for Logic	VI	VSS	VDD+0.3	V	—
Power Supply for LCD Driver	VDD-VEE	0	30	V	—
LCD Driving Voltage	VDD-Vo	0	30	V	$VEE \cong V_o$

2-3. CFL Backlighting

($T_a = 0 \sim +50^\circ\text{C}$)

Item	Symbol	Min.	Max.	Unit
Circuit Voltage	VS	—	(1320)	Vrms
Lamp Current	IL	2	9	mArms
Operating Frequency	f	30	100	KHz

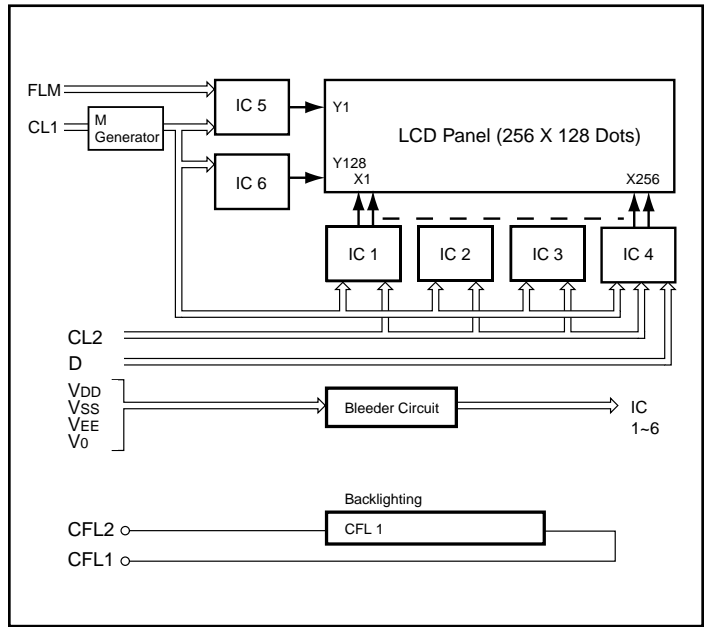
3. Interface Pin Function

CN-1, CN-3

Pin No.	Symbol	Effective Signal Level	Function
1	VDD	—	Power Supply for Logic (+5V)
2	VSS	—	GND for Logic (0V)
3	Vo	—	Operating Voltage for LCD Driving
4	CL1	H L	Display Data Latch Signal
5	NC	—	No Connection
6	D.OFF	H/L	Display OFF Signal*1
7	NC	—	No Connection
8	FLM	H/L	Frame Pulse (Display Cycle)
9	CL2	H L	Display data Shift Clock
10	NC	—	No Connection
11	D0	H/L	Display Data 0
12	D1	H/L	Display Data 1
13	D2	H/L	Display Data 2
14	D3	H/L	Display Data 3
15	VEE	—	Power Supply for LCD Drive (-20V)

*1 (D.OFF is pulled up to V_{DD} through 10K Ω in the module)

4. Block Diagram



5. Electrical Characteristics

5-1. LCD Driving

($T_a = 25^\circ\text{C}$, $V_{DD} = 5\text{V}$, $V_{EE} = -20\text{V}$)

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	VDD-VSS	4.75	5.0	5.25	V
Supply current— $V_{DD}-V_o = 19.2\text{V}$	IDD	—	7.3	30.0	mA
$f_{CL1} = 10.24\text{KHz}$	IEE	—	5.9	24.0	mA
Input "High" Voltage	VIH	0.7VDD	—	VDD	V
Input "Low" Voltage	VIL	VSS	—	0.3VDD	V
LCD Driving Voltage*1	VDD-Vo	—	19.2	—	V
Latch Pulse Frequency	fCL1	9.9	10.24	22	KHz

*1 : The above value of power supply voltage applies where $T_a = 25^\circ\text{C}$. Please adjust the actual voltage individually to get the best contrast ratio at 25°C . (Refer to: Article 4-4, Power Supply Example) LCD driving voltage and current consumption are changed by display indicator contents. Check the LCD driving frequency before the setting since it may vary depending on the types of display.

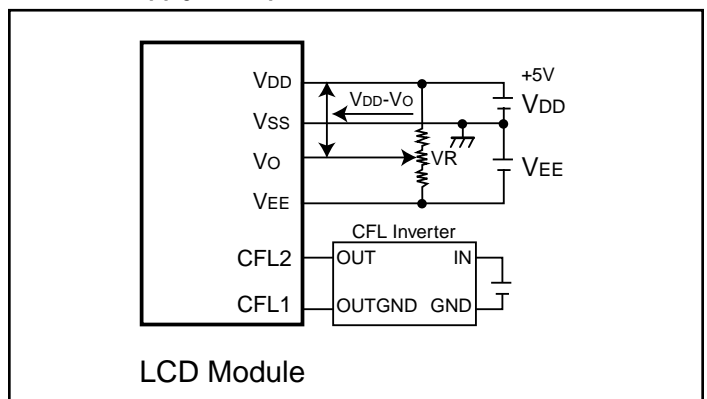
5-2. CFL Backlighting

($f = 55\text{KHz}$, $T_a = +25^\circ\text{C}$)

Item	Symbol	Min.	Typ.	Max.	Unit
Circuit Voltage*1	VS	—	(1200)	—	Vrms
Lamp Voltage	VL	300	335	370	Vrms
Lamp Current	IL	4.5	5	5.5	mArms
Power Consumption	P	—	(1.68)	—	W
Operating Frequency	f	50	55	60	KHz

*1 : Inverter no load output voltage.

6. Power Supply Example



Recommended Inverter: 12V Input 13586A-CFL-INV VR: 10K Ω ~ 20K Ω