



SPECIFICATIONS

CUSTOMER : _____

MODEL NO. : **GFC1202B-YPFE-JPD**

VERSION : **C**

DATE : **2012.10.18**

CERTIFICATION : **ROHS**

| Customer Sign | Approved By | Prepared By | Prepared By |
|---------------|-------------|-------------|-------------|
| | | | |

Revision Record

| Data(y/m/d) | Ver. | Description | Note | page |
|-------------|------|-----------------------------|------|------|
| 2010.08.30 | A | Specification released | | |
| 2010.10.07 | B | Modify R8 to 0 O,R9 to 680O | | |
| 2012.10.18 | C | Modify VOP 4.4 to 3.85V | | |
| | | | | |
| | | | | |



3. Backlight Characteristic

3.1 Electrical / optical specifications

Ta = 25°C

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------------|--------|-------------------|------|------|------|-------|
| Forward voltage | V_f | If=40mA, White | 2.9 | 3.2 | 3.6 | V |
| LED *Luminous Intensity | I_v | If=40mA, White | -- | 150 | -- | Cd/m2 |
| Chromaticity Coordinate | x | If=40mA, White | 0.26 | 0.31 | 0.36 | |
| | y | | 0.25 | 0.32 | 0.37 | |
| Reverse Current | I_R | VR=5V, White | -- | -- | 0.1 | mA |

Note: * Measured at the bare LED back-light unit.

3.2 LED Maximum Operating Range

| Item | Symbol | White | Unit |
|-------------------|----------|-------|------|
| Power Dissipation | P_{AD} | 144 | mW |
| Forward Current | I_F | 40 | mA |
| Reverse Voltage | V_R | 5 | V |

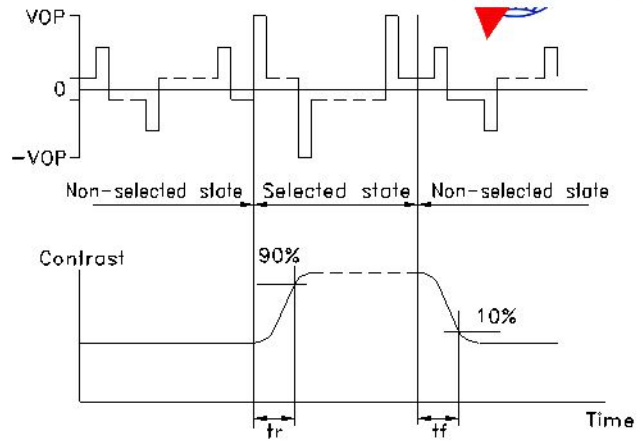
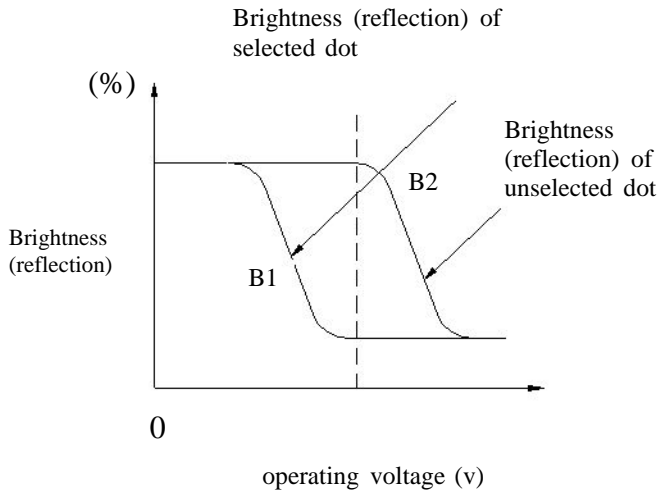
4. Absolute Maximum Ratings

| Item | Symbol | Conditions | Min. | Max. | Unit |
|-----------------------|--|------------|------|--------------|------|
| Power supply Voltage | V_{DD} | - | -0.3 | 7.0 | V |
| Input voltage Range | V_{IN} | - | -0.3 | $V_{DD}+0.3$ | V |
| Operating temperature | T_{OPR} | - | -20 | 70 | |
| Storage temperature | T_{STG} | - | -30 | 80 | |
| Static electricity | Be sure that you are grounded when handing LCM | | | | |

Notes: 1. Exceeding the absolute maximum ratings may cause permanent damage to the device.
Functional operation under these conditions is not implied.

5. DC Electrical Characteristics (Without LED back-light)

| Characteristic | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------------------|------------|--|--------------|------|--------------|---------|
| Operating Voltage | V_{DD} | -- | 2.7 | 3.3 | 4.5 | V |
| Supply Current | I_{DD} | Internal oscillation or external clock ($V_{DD}=5.0V, f_{OSC}=270kHz$) | -- | 0.2 | 0.4 | mA |
| Input Voltage(1) (except OSC1) | V_{IH1} | -- | $0.7 V_{DD}$ | -- | V_{DD} | V |
| | V_{IL1} | -- | -0.3 | -- | 0.55 | |
| Input Voltage(2) (OSC1) | V_{IH2} | -- | $0.7V_{DD}$ | -- | V_{DD} | V |
| | V_{IL2} | -- | -0.2 | -- | $0.2 V_{DD}$ | |
| Output Voltage(1) (DB0 to DB7) | V_{OH1} | $I_{OH}=-0.1mA$ | $0.75V_{DD}$ | -- | -- | V |
| | V_{OL1} | $I_{OL}=0.1mA$ | -- | -- | $0.2 V_{DD}$ | |
| Output Voltage(2) (DB0 to DB7) | V_{OH2} | $I_o=-40\mu A$ | $0.8V_{DD}$ | -- | -- | V |
| | V_{OL2} | $I_o=40\mu A$ | -- | -- | $0.2V_{DD}$ | |
| Voltage Drop | V_{dCOM} | $I_o=0.1mA$ | -- | -- | 1 | V |
| | V_{dSEG} | | -- | -- | 1 | |
| Input Leakage Current | I_{IKG} | $V_{IN}=0V$ to V_{DD} | -1 | -- | 1 | μA |

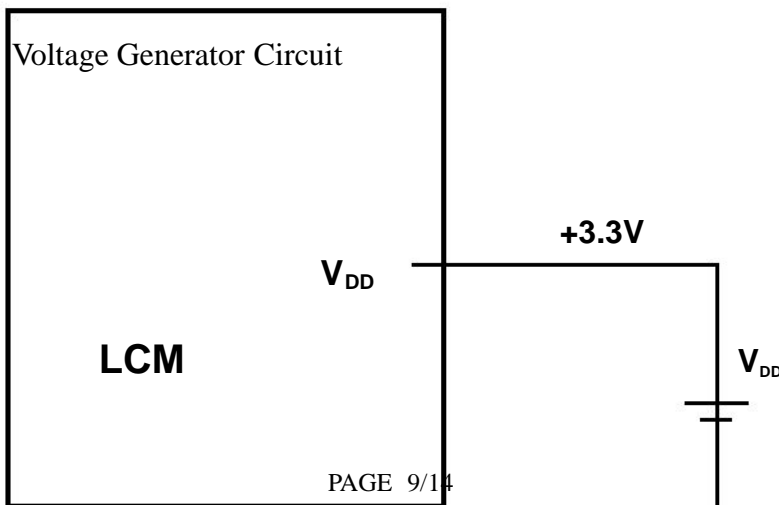


Note: Measured with a transmissive LCD panel which is displayed 1 cm²

V_{OPR} : Operating voltage f_{FRM} : Frame frequency
 t_{ON} : Response time (rise) t_{OFF} : Response time (fall)

7. Interface Pin Description

| NO. | Symbol | Function |
|------|---------|--------------------------------|
| 1 | VSS | Ground (0V) |
| 2 | VDD | Power supply for Logic circuit |
| 3 | NC | NC |
| 4 | RS | Data / Instruction select |
| 5 | R/W | Read / Write select |
| 6 | E | Enable signal |
| 7-14 | DB0-DB7 | Data Bus line |
| 15 | LED A | Power supply for LED |



10. Display Command

| Instructions | Instruction Code | | | | | | | | | | Description | Execution Time (fosc= 270KHZ) |
|----------------------------|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|----------------------------------|
| | RS | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | | |
| Clear Display | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Write "20H" to DDRAM. and set DDRAM address to "00H" from AC. | 1.52ms |
| Return Home | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | x | Set DDRAM address to "00H" from AC and return cursor to it's original position if shifted. The contents of DDRAM are not changed. | 1.52ms |
| Entry Mode Set | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | I/D | SH | Assign cursor moving direction and make shift of entire display enable. | 38µs |
| Display ON/OFF Control | 0 | 0 | 0 | 0 | 0 | 0 | 1 | D | C | B | Sets display (D), cursor(C), and blinking of cursor(B) on/off control bit. | 38µs |
| Cursor or Display Shift | 0 | 0 | 0 | 0 | 0 | 1 | S/C | R/L | x | x | Set cursor moving and display shift control bit, and the direction, without changing of DDRAM data. | 38µs |
| Function Set | 0 | 0 | 0 | 0 | 1 | DL | N | F | x | x | Set interface data length (DL:4-bit/8-bit), numbers of display line (N: 1-line/2-line), display font type(F:5*8 dots/5*11 dots) | 38µs |
| Set CGRAM Address | 0 | 0 | 0 | 1 | AC5 | AC4 | AC3 | AC2 | AC1 | AC0 | Set CGRAM address in address counter. | 38µs |
| Set DDRAM Address | 0 | 0 | 1 | AC6 | AC5 | AC4 | AC3 | AC2 | AC1 | AC0 | Set DDRAM address in address counter. | 38µs |
| Read Busy Flag and Address | 0 | 1 | BF | AC6 | AC5 | AC4 | AC3 | AC2 | AC1 | AC0 | Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read. | 0µs |
| Write Data to RAM | 1 | 0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Write data into internal RAM (DDRAM/CGRAM). | 38µs |
| Read Data from RAM | 1 | 1 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Read data from internal RAM (DDRAM/CGRAM). | 38µs |

