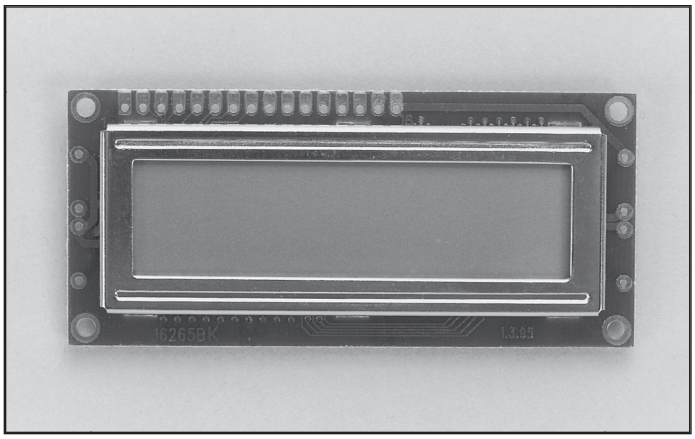


# AND671WGST-LED
## Intelligent Character Display

The AND4671WGST-LED is an STN Positive Graye liquid crystal display. It has a transflective rear polarizer, white LED backlight, 12 o-clock viewing angle and a wide temperature range with a 3.3V single supply voltage.

## Features

- STN Positive Gray
- Transflective Rear Polarizer
- White LED Backlight
- 12 O'clock Viewing Direction
- Wide Temperature Range, 3.3V, Single Supply Voltage
- Silver Frame
- **ROHS Compliant**

### Mechanical Characteristics

| Item | Standard Value | Unit |
|---|---|---|
| Module Size | 80.0 (W) x 36.0 (H) x 8.8.0 (12.7) (D) (max.) | mm |
| Viewing Area | 65.0 (W) x 16.0 (H) | mm |
| Dot Size | 0.56 (W) x 0.66 (H) | mm |
| Dot Pitch | 0.60 (W) x 0.70 (H) | mm |
| Display Format | 16 characters (W) x 2 lines (H) | – |
| Duty Ratio | 1/16 Duty | – |
| Controller | ST7066U or equivalent | – |

### Electrical Absolute Maximum Ratings

| Item | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Power Supply for Logic | VDD - VSS | -0.3 | – | 7.0 | V |
| Power Supply for LCD | VDD - VSS | -0.3 | – | 10.0 | V |
| Input VOltage | VI | -0.3 | – | VDD | V |
| LED Power Dissipation | PAD | – | – | 90 | mW |
| LED Forward Current | IAF | – | – | 24 | mA |
| LED Reverse Voltage | VR | – | – | 5 | V |

## Electrical Characteristics

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Power Supply for Logic | VDD - VSS | – | 2.7 | 3.3 | 4.5 | V |
| Input Voltage | VIL | L Level | 0 | –- | 0.6 | V |
| | VIH | H Level | 2.2 | — | VDD | V |
| LCM Recommend LCD Module Driving Voltage | VDD-VO | Ta = 0ºC | — | — | — | V |
| | | Ta=25ºC | 2.7 | 3.3 | 4.5 | |
| | | Ta=50ºC | — | — | — | |
| Power Supply Current for LCM | IDD | VDD = 3.3V, VDD-V0=3.3V | — | 2.0 | 3.0 | mA |
| LED Forward Voltage | VF | iF = 20 mA | — | 3.4 | 3.6 | V |
| LED Frward Current | IF | — | — | 20 | — | mA |
| LED Reverse Voltage | IR | VR=5V | — | — | 0.2 | mA |

## Optical Specifications (Ta = 25 ºC)

| Item | Symbol | Remarks | Specifications Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Viewing Angle | Φ f (12 o'clock) | When CR ≥ 1.4 | – | 20 | – | deg |
| | Φ b (6 o'clock) | | – | 40 | – | |
| | Φ l (9 o'clock) | | – | 30 | – | |
| | Φ r (3 o'clock) | | – | 30 | – | |
| Rise Time | Tr | VDD-VO = 3.3 V Ta = 25ºC | – | 200 | – | mS |
| Fall Time | Tf | | – | 250 | – | |
| Frame Frequency | Frm | | – | 64 | – | Hz |
| Contrast | Cr | | – | 3.0 | – | – |
| Brightness of Backlight | L | IF = 20 mA | 120 | 180 | – | cd/m$^2$ |
| Peak Emission Wavelength | λ P | | x = 0.29 y = 0.30 | x = 0.31 y = 0.32 | x = 0.33 y = 0.34 | nm |

## Environmental Absolute Maximum Ratings

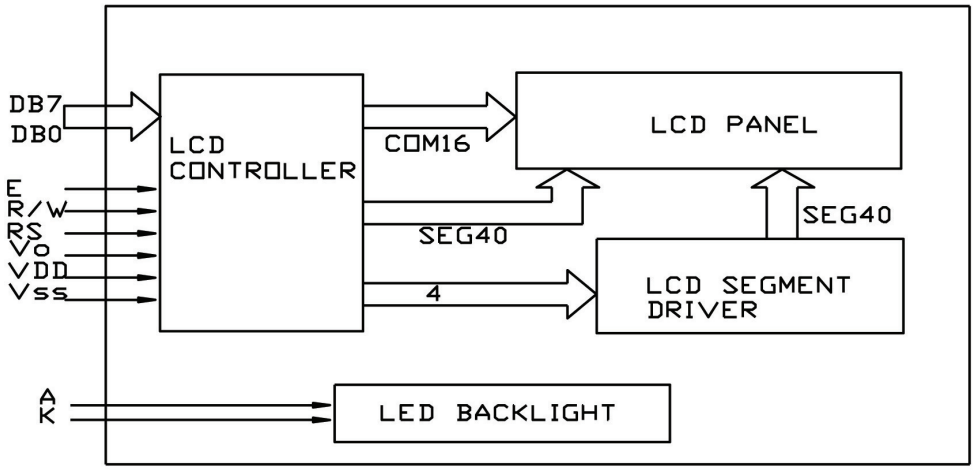
| Item | Wide Temperature | | | |
|---|---|---|---|---|
| | Operating | | Storage | |
| | Min. | Max. | Min. | Max. |
| Ambient Temperature | -20 ºC | +70 ºC | -30 ºC | +80ºC |
| Humidity (without condensation) | Note 4, 5 | | Note 4,6 | |

Note 4: Background color changes slightly depending on ambient temperature. This phenomenon is reversible.
Note 5: Ta ≤ 70ºC: 75 RH max; Ta > 70ºC: absolute humidity must be lower than the humidity of 75% RH at 70ºC.
Note 6: Ta at -30ºC will be <48 hrs, at 80ºC will be < 120 hrs when humidity is higher than 75%.

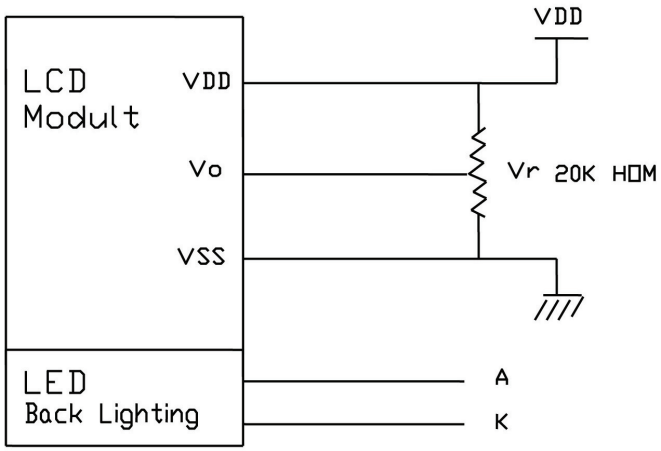
## Interface Pin Assignment

| Pin No. | Pin Out | Level | Function Description | | Pin No | Pin Out | Level | Function Description |
|---|---|---|---|---|---|---|---|---|
| 1 | VSS | 0V | Power Supply Ground | | 9 | DB2 | H/L | Data Bit 2 |
| 2 | VDD | 3.3V | Power Supply Voltage | | 10 | DB3 | H/L | Data Bit 3 |
| 3 | V0 | — | Contrast Adjustment | | 11 | DB4 | H/L | Data Bit 4 |
| 4 | RS | H/L | Register Select | | 12 | DB5 | H/L | Data Bit 5 |
| 5 | R/W | H/L | Read/ Write | | 13 | DB6 | H/L | Data Bit 6 |
| 6 | E | H, H —>L | Enable Signal | | 14 | DB7 | H/L | Data Bit 7 |
| 7 | DB0 | H/L | Data Bit 0 | | 15 | A | 3.5V | LED Power Supply (+) |
| 8 | DB1 | H/L | Data Bit 1 | | 16 | K | 0V | LED Power Supply (-) |

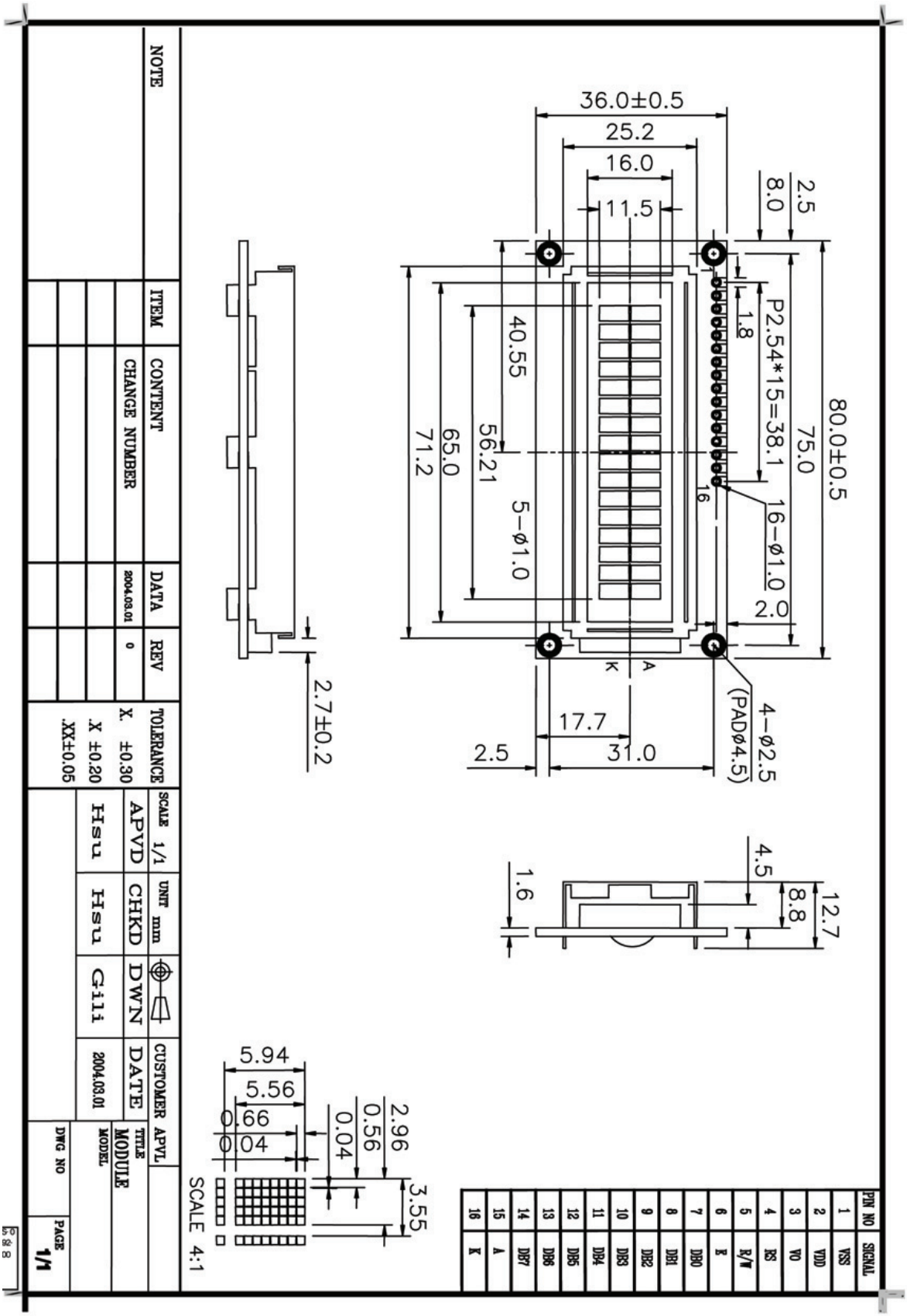
## Block Diagram




## Power Supply



## Mechanical Dimensions

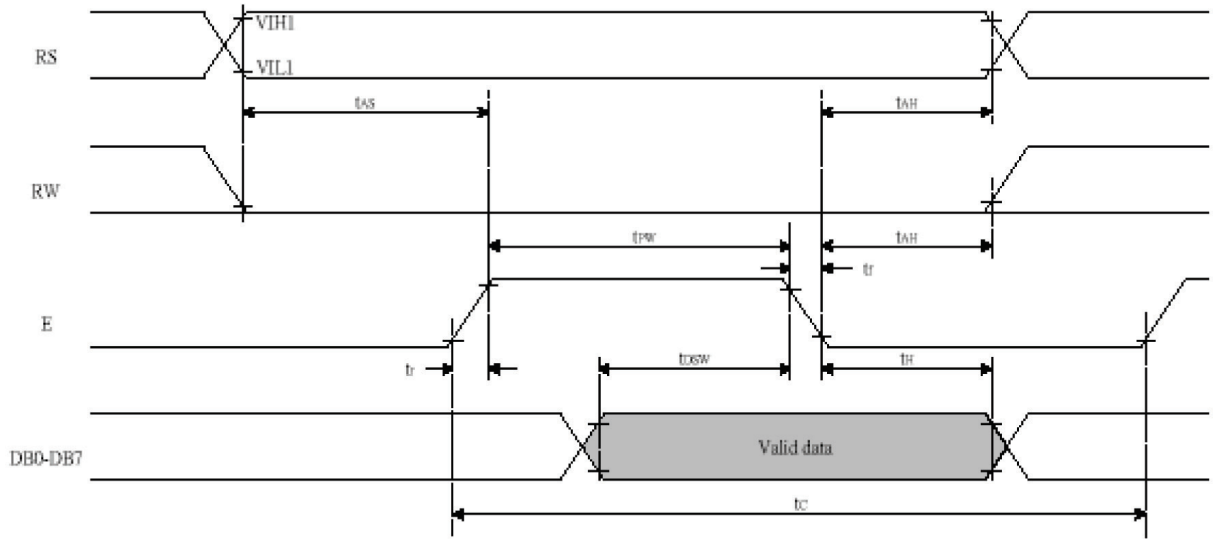


**Timing Characteristics** (Ta = 25 ºC, VCC = 2.7V)

| Symbol | Characteristics | Test Condition | Specifications | | | Units |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Internal Clock Operation | | | | | | |
| $f_{OSC}$ | OSC Frequency | R = 75KΩ | 190 | 270 | 350 | KHz |
| External Clock Operation | | | | | | |
| $f_{EX}$ | External Frequency | – | 125 | 270 | 410 | KHz |
| | Duty Cycle | – | 45 | 50 | 55 | % |
| $T_R$, $T_F$ | Rise/Fall Time | – | – | – | 0.2 | μs |
| Write Mode (Writing data from MPU to ST7066U) | | | | | | |
| $T_C$ | Enable Cycle Time | Pin E | 1200 | – | – | ns |
| $T_{PW}$ | Enable Plus Time | Pin E | 460 | – | – | ns |
| $T_R$, $T_F$ | Enable Rise/Fall Time | Pin E | – | – | 25 | ns |
| $T_{AS}$ | Address Setup Time | Pins RS, RW, E | 0 | – | – | ns |
| $T_{AH}$ | Address Hold Time | Pins RS, RW, E | 10 | – | – | ns |
| $T_{DSW}$ | Data Setup Time | Pins: DB0 - DB7 | 80 | – | – | ns |
| $T_H$ | Data Hold Time | Pins: DB0 - DB7 | 10 | – | – | ns |
| Read Mode (Reading Data from ST7066U to MPU) | | | | | | |
| $T_C$ | Enable Cycle Time | Pin E | 1200 | – | – | ns |
| $T_{PW}$ | Enable Pulse Width | Pin E | 480 | – | – | ns |
| $T_R$, $T_F$ | Enable Rise/Fall Time | Pin E | – | – | 25 | ns |
| $T_{AS}$ | Address Setup Time | Pins: RS, RW, E | 0 | – | – | ns |
| $T_{AH}$ | Address Hold Time | Pins: RS, RW, E | 10 | – | – | ns |
| $T_{DOR}$ | Data Setup Time | Pins: DB0 - DB& | – | – | 320 | ns |
| $T_H$ | Data Hold Time | Pins: DB0 - DB7 | 10 | – | – | ns |

## Read/Write Timing Chart

- **Writing data from MPU to ST7066U**




- **Reading data from ST7066U to MPU**