



ASI-T-177BA28N/D

| Item | Contents | Unit |
|-------------------------------|------------------------------|------|
| Size | 1.77 | inch |
| Resolution | 128X(RGB) x 160 | / |
| Interface | 8-bits | / |
| Technology type | TN TFT | / |
| Pixel pitch | 0.219x0.219 | mm |
| Pixel Configuration | Stripe | |
| Outline Dimension (W x H x D) | 34.7x46.7x2.6 | mm |
| Active Area | 35.04 x 28.03 | mm |
| Display Mode | Transmissive, Normally white | / |
| Backlight Type | LED | / |
| Driver IC | ILI9163V | / |
| Weight | TBD | g |



Record of Revision

| Date | Revision No. | Summary |
|------------|--------------|--------------------|
| 2015-10-20 | 1.0 | Rev 1.0 was issued |
| | | |
| | | |
| | | |



ASI-T-177BA28N/D

1. Scope

This data sheet is to introduce the specification of ASI-T-177BA28N/D active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 1.77" display area contains 128X(RGB) x 160 pixels.

2. Application

Digital equipments which need color display, mobile phone, mobile navigator/video systems.

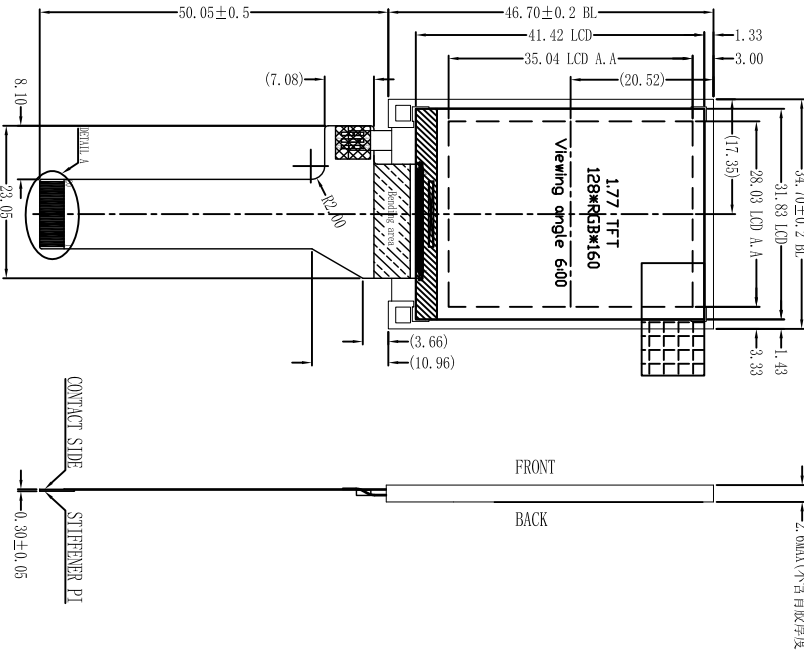
3. General Information

| Item | Contents | Unit |
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4. Outline Drawing

NOTE:

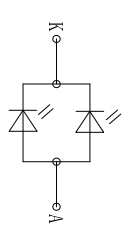
- 1 DISPLAY TYPE : 1.77" QOVGA TFT
- 2 VIEWING DIRECTION : 6 O'CLOCK
- 3 LCD DRIVER : ILI9163V
- 4 OPERATING TEMP : -20° C---+70° C
- 5 STORAGE TEMP : -30° C---+80° C
- 6 UNSPECIFIED TOLERANCE ±0.2

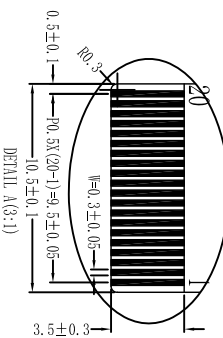


FRONT
BACK

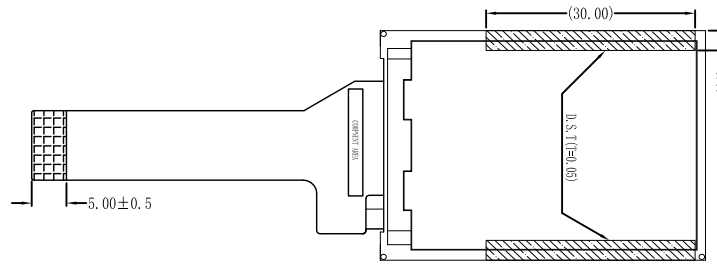
CONTACT SIDE
STRENGTHENER PL

LED CIRCUIT DIAGRAM:





DETAIL A(3:1)



DETAIL B(3:1)

| PIN | ASSIGNMENT |
|-----|------------|
| 1 | GND |
| 2 | 10VCC 1.8V |
| 3 | VCC 2.8V |
| 4 | CSB |
| 5 | RST |
| 6 | RS |
| 7 | WRB |
| 8 | RDB |
| 9 | DB0 |
| 10 | DB1 |
| 11 | DB2 |
| 12 | DB3 |
| 13 | DB4 |
| 14 | DB5 |
| 15 | DB6 |
| 16 | DB7 |
| 17 | BL_A |
| 18 | BL_K |
| 19 | NC |
| 20 | GND |

| | | | |
|---------------|-----------|------------|----|
| DRAWN BY: | TITLE: | SCALE: | |
| CHECKED BY: | DWG NO.: | UNIT: mm | |
| APPROVED BY: | DWG NAME: | DATE: | OP |
| CONFIRMED BY: | | SHEET NO.: | |

5. Interface signals

| No. | Symbol | Function | Remark |
|-----|--------|---------------------------|--------|
| 1 | GND | Ground | |
| 2 | IOVCC | TYP: 2.8 V/1.8V | |
| 3 | VCC | TYP: 2.8 V | |
| 4 | CSB | Chip Selection | |
| 5 | RST | Reset Signal | |
| 6 | RS | Data or Command selection | |
| 7 | WRB | Write Enable | |
| 8 | RDB | Read Enable | |
| 9 | DB0 | Data bus | |
| 10 | DB1 | Data bus | |
| 11 | DB2 | Data bus | |
| 12 | DB3 | Data bus | |
| 13 | DB4 | Data bus | |
| 14 | DB5 | Data bus | |
| 15 | DB6 | Data bus | |
| 16 | DB7 | Data bus | |
| 17 | BL_A1 | Anode pin of backlight | |
| 18 | BL_K | Cathode pin of backlight | |
| 19 | NC | No connection | |
| 20 | GND | Ground | |



6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

| Parameter | Symbol | MIN | MAX | Unit | Remark |
|--------------------------|--------|------|------|------|--------|
| Supply voltage for logic | IOVCC | -0.3 | +4.6 | V | |
| Power voltage for Analog | VCC | -0.3 | +4.6 | V | |

6.2. Environment Conditions

| Item | Symbol | MIN | MAX | Unit | Remark |
|-----------------------|--------|-----|-----|------|--------|
| Operating Temperature | TOPR | -20 | 70 | °C | |
| Storage Temperature | TSTG | -30 | 80 | °C | |

6.3. LED Backlight Absolute max. ratings

| Item | Symbol | MIN | MAX | Unit | Remark |
|---------------------|--------|-----|-----|------|---------|
| LED Forward Current | ILED | -- | 25 | mA | One LED |



7. Electrical Specifications

7.1 Electrical characteristics

Ta=25°C

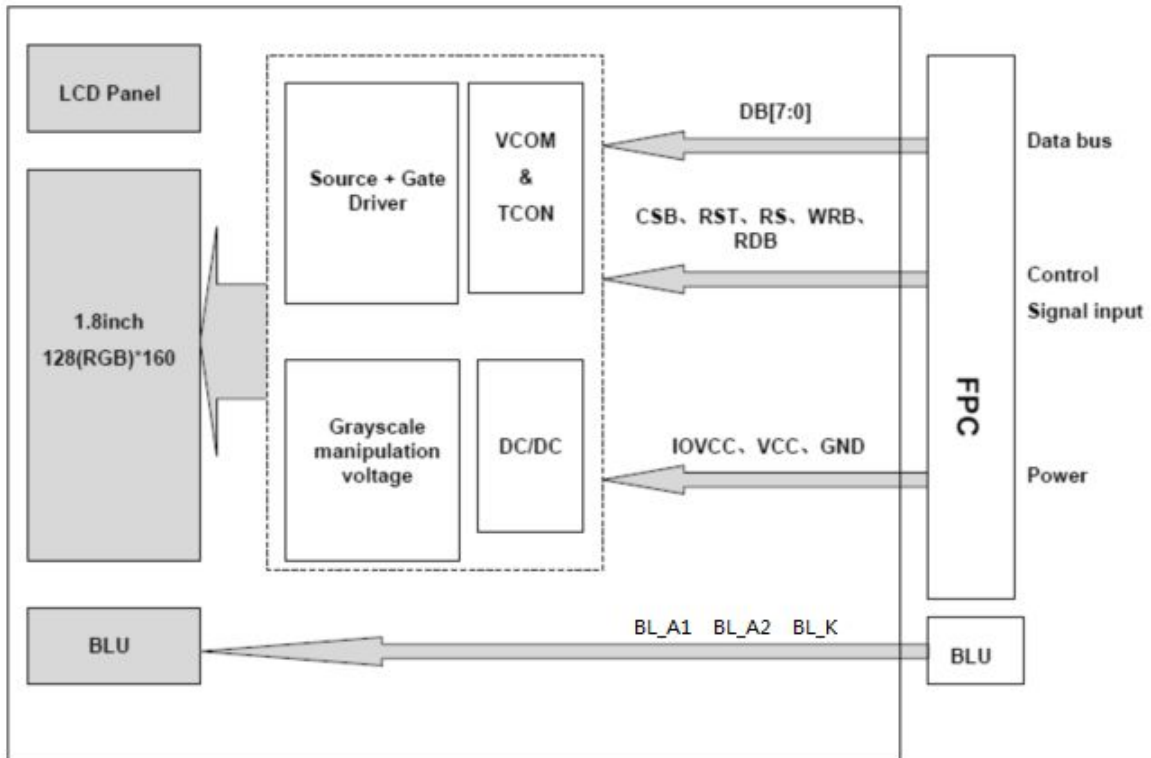
| Item | Symbol | MIN | TYP | MAX | Unit | Remark |
|----------------------------------|--------|-----------|-----|-----------|------|--------|
| Supply voltage for logic | IOVCC | 1.65 | 2.8 | 3.3 | V | |
| Power voltage for Analog | VCC | 2.5 | 2.8 | 3.3 | V | |
| Logic Low input voltage | VIL | GND | - | 0.3*IOVCC | V | |
| Logic High input voltage | VIH | 0.7*IOVCC | - | IOVCC | V | |
| Logic Low output voltage | VOL | GND | - | 0.2*IOVCC | V | |
| Logic High output voltage | VOH | 0.8*IOVCC | - | IOVCC | V | |
| Current Consumption All Black | Logic | ICC+ IIN | - | 1.52 | - | mA |
| | Analog | | | | | |

7.2 LED Backlight

Ta=25°C

| Item | Symbol | MIN | TYP | MAX | Unit | Remark |
|-------------------|--------|-----|----------|-----|------|--------------------------|
| Forward Current | IF | -- | 15*2 | | mA | Ta=25 °C, VF=3.2V/LED |
| Forward Voltage | VF | 3.0 | 3.2 | 3.4 | V | Ta=25 °C, IF=15mA/LED |
| Power dissipation | PD | - | 96 | 136 | mW | |
| LED life time | - | - | (25,000) | - | Hrs | |

7.3 Schematic of LCD module system



| Signal | Symbol | Parameter | min | max | unit | description |
|----------|--------|-----------------------------------|-----|-----|------|-----------------------------------------------------|
| D/CX | tast | Address setup time | 0 | | ns | |
| | taht | Address hold time(Write/Read) | 10 | | ns | |
| CSX | tchw | "S""H" Pulse Width | 0 | | ns | |
| | tcs | Chip Select setup time (Write) | 10 | | ns | |
| | trcs | Chip Select setup time (Read ID) | 45 | | ns | |
| | trcsfm | Chip Select setup time (Read FM) | 355 | | ns | |
| | tcsf | Chip Select Wait time(Write/read) | 10 | | ns | |
| WRX | twc | Write cycle | 66 | | ns | |
| | twrh | Controlpulse H duration | 15 | | ns | |
| | twrl | Control pulse L duration | 15 | | ns | |
| RDX | trc | Read cycle (ID) | 160 | | ns | When read ID data |
| | trdh | Control pulse H duration(ID) | 90 | | ns | |
| | trdl | Control pulse L duration(ID) | 45 | | ns | |
| RDX | trcfm | Read cycle (FM) | 450 | | ns | When read from frame memory |
| | trdhfm | Control pulse H duration (FM) | 90 | | ns | |
| | trdlfm | Control pulse L duration (FM) | 355 | | ns | |
| D[17..0] | tdst | Data setup time | 10 | | ns | For maximum CL = 30pF For minimum CL = 8pF |
| | tdht | Data hold time | 10 | | ns | |
| | trat | Read access time (ID) | | 40 | ns | |
| | tratfm | Read access time (FM) | | 340 | ns | |
| | todh | Output disable time | 20 | 80 | ns | |

Note 1: VDDI 1.65 to 3.3V, VDD=2.6 to 3.3V, AGND=GND=0V, Ta=-30 to 70 °C (to +85°C no damage)

Note 2: This input signal rise time and fall time (tr, tf) is specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for input signals

9. Optical Specification

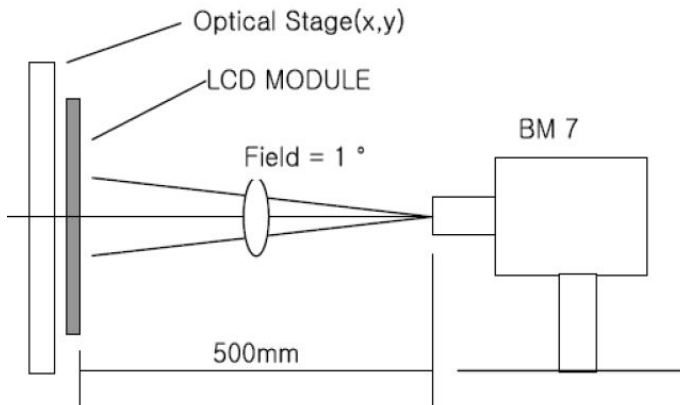
Ta=25°C

| Item | Symbol | Condition | Min | Typ. | Max. | Unit | Remark |
|----------------|------------|------------------|-----|-------|-------|-------------------|-----------------|
| Contrast Ratio | CR | $\theta=0^\circ$ | 400 | 500 | -- | | Note1 Note2 |
| Response Time | Ton/ Toff | 25°C | -- | 20 | 30 | ms | Note1 Note3 |
| View Angles | θT | CR ≥ 10 | 35 | 50 | - | Degree | Note 4 |
| | θB | | 10 | 20 | - | | |
| | θL | | 35 | 45 | - | | |
| | θR | | 35 | 45 | - | | |
| Chromaticity | White | Brightness is on | x | 0.253 | 0.303 | 0.353 | Note5, Note1 |
| | | | y | 0.306 | 0.356 | 0.406 | |
| | Red | | x | 0.575 | 0.625 | 0.675 | |
| | | | y | 0.272 | 0.322 | 0.372 | |
| | Green | | x | 0.250 | 0.300 | 0.350 | |
| | | | y | 0.514 | 0.564 | 0.614 | |
| | Blue | | x | 0.084 | 0.134 | 0.184 | |
| | | | y | 0.109 | 0.159 | 0.209 | |
| Luminance | L | | - | 200 | - | cd/m ² | Note1 Note6 |

Note 1: Definition of optical measurement system.

Temperature = 25°C (±3°C)

LED back-light: ON, Environment brightness < 150 lx

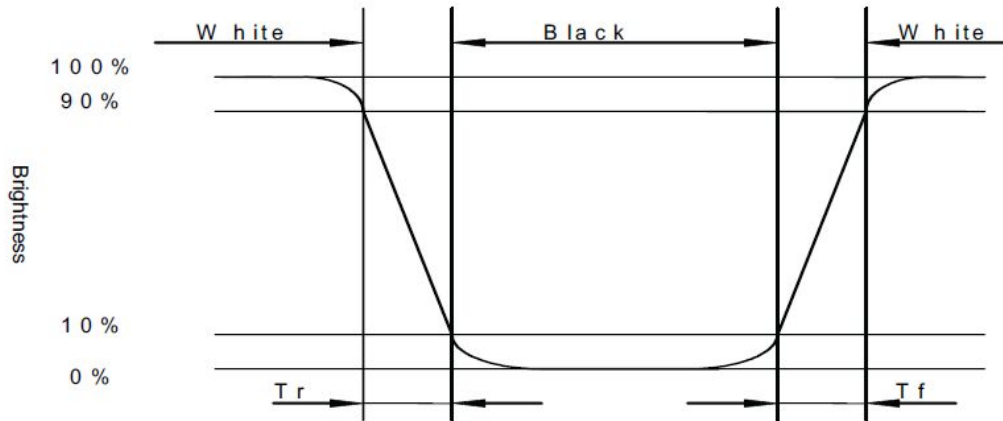


Note 2: Contrast ratio is defined as follow:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

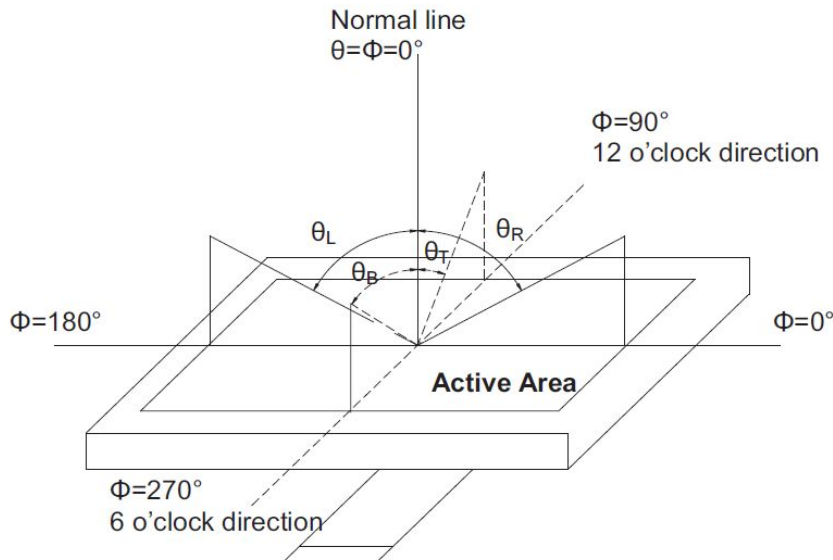
Note 3: Response time is defined as follow:

Response time is the time required for the display to transition from black to white (Rise Time, T_r) and from white to black(Decay Time, T_f).



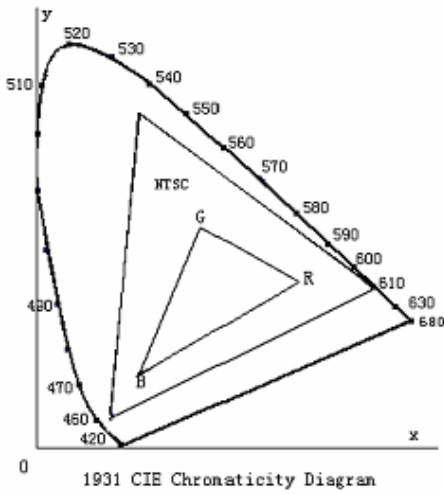
Note 4: Viewing angle range is defined as follow:

Viewing angle is measured at the center point of the LCD.



Note 5: Color chromaticity is defined as follow: (CIE1931)

Color coordinates measured at center point of LCD.



$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 6: Luminance is defined as follow:

Luminance is defined as the brightness of all pixels “White” at the center of display area on optimum contrast.



10. Environmental / Reliability Tests

| No | Test Item | Condition | Judgment criteria |
|----|-----------------------------------|-----------------------------------------------------------|-------------------------------------------------------------|
| 1 | High Temp Operation | Ts=+70°C, 48hrs | Per table in below |
| 2 | Low Temp Operation | Ta=-20°C, 48hrs | Per table in below |
| 3 | High Temp Storage | Ta=+80°C, 48hrs | Per table in below |
| 4 | Low Temp Storage | Ta=-30°C, 48hrs | Per table in below |
| 5 | High Temp & High Humidity Storage | Ta=+50°C, 90% RH 48 hours | Per table in below (polarizer discoloration is excluded) |
| 6 | Thermal Shock (Non-operation) | -20°C 30 min~+70°C 30 min, Change time:5min, 10 Cycles | Per table in below |

| INSPECTION | CRITERION(after test) |
|------------------------|-------------------------------------------------------------------------------------|
| Appearance | No Crack on the FPC, on the LCD Panel |
| Alignment of LCD Panel | No Bubbles in the LCD Panel No other Defects of Alignment in Active area |
| Electrical current | Within device specifications |
| Function / Display | No Broken Circuit, No Short Circuit or No Black line No Other Defects of Display |

11. Precautions for Use of LCD Modules

11.1 Safety

The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

11.2 Handling

- A. The LCD and touch panel is made of plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
- B. Do not handle the product by holding the flexible pattern portion in order to assure the reliability
- C. Transparency is an important factor for the touch panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.
- D. Provide a space so that the panel does not come into contact with other components.
- E. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.
- F. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.
- G. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.
- H. To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.

11.3 Static Electricity

- A. Ground soldering iron tips, tools and testers when they are in operation.
- B. Ground your body when handling the products.
- C. Power on the LCD module before applying the voltage to the input terminals.
- D. Do not apply voltage which exceeds the absolute maximum rating.
- E. Store the products in an anti-electrostatic bag or container.

11.4 Storage

- A. Store the products in a dark place at $+25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ with low humidity (40% RH to 60% RH). Don't expose to sunlight or fluorescent light.
- B. Storage in a clean environment, free from dust, active gas, and solvent.

11.5 Cleaning

- A. Do not wipe the touch panel with dry cloth, as it may cause scratch.
- B. Wipe off the stain on the product by using soft cloth moistened with ethanol. Do not allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. Do not use any organic solvent or detergent other than ethanol.

11.6 Cautions for installing and assembling

Bezel edge must be positioned in the area between the Active area and View area. The bezel may press the touch screen and cause activation if the edge touches the active area. A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected activation if the gap is too narrow. There is a tolerance of 0.2 to 0.3mm for the outside dimensions of the touch panel and tail. A gap must be made to absorb the tolerance in the case and connector.

