



一众显示科技有限公司

TEAM SOURCE DISPLAY TECH. CO, LTD.

TFT-LCD Module Specification

Module NO.: TSM070WVBE-32

Version: V1.0

APPROVAL FOR SPECIFICATION

APPROVAL FOR SAMPLE

| For Customer' s Acceptance: | |
|-----------------------------|---------|
| Approved by | Comment |
| | |

| Team Source Display: | | |
|----------------------|-------------|-------------|
| Presented by | Reviewed by | Approved by |
| Zahi | Aron | Aron |

| Version No. | Date | Content | Remark |
|-------------|------------|-----------------|--------|
| V1.0 | 2020-08-25 | Initial Release | |
| | | | |
| | | | |

CONTENTS

1 GENERAL CHARACTERISTICS - 3 -

2 PRODUCT DRAWINGS - 4 -

3 INTERFACE DESCRIPTION - 5 -

4 PARALLEL 8080-SERIES INTERFACE TIMING - 6 -

5 LCD RGB TIMING CHARACTERISTICS - 7 -

6 INPUT PIXEL DATA FORMAT - 9 -

7 COMMAND TABLE - 10 -

8 ABSOLUTE MAXIMUM RATINGS - 13 -

9 ELECTRICAL CHARACTERISTICS - 13 -

10 BACKLIGHT CHARACTERISTICS - 13 -

11 LCD OPTICAL SPECIFICATIONS - 14 -

12 TOUCH PANEL SPECIFICATIONS - 16 -

13 RELIABILITY TEST - 16 -

14 SUGGESTIONS FOR USING LCD MODULES - 17 -

 14.1 HANDLING OF LCM - 17 -

 14.2 STORAGE - 17 -

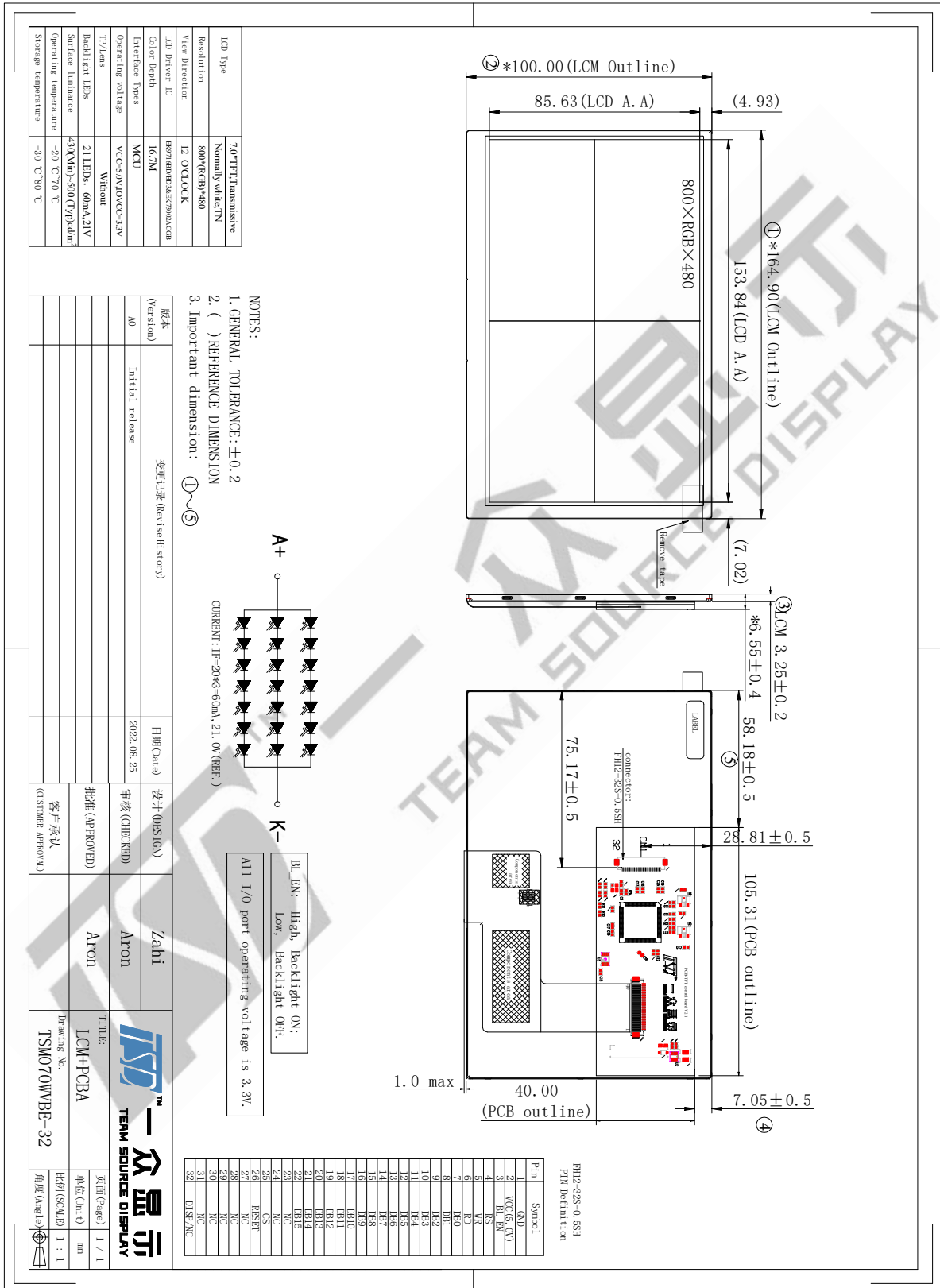
1 General Characteristics

| ITEM | Specification | Unit |
|--------------------------------|--|-------------------|
| LCD Type | a-Si TFT, Transmissive, Normally white, TN | - |
| LCD Size | 7.0 | inch |
| Resolution (W x H) | 800x (RGB) × 480 | pixel |
| Outline size | 164.9(W) x 100(H) x 6.55(D) | mm |
| Active Area | 153.84 (H) x 85.63(V) | mm |
| Dot Pitch | 0.0642(H)x3 × 0.1790(V) | mm |
| Viewing Direction | 12 o'clock | - |
| Gray Scale Inversion Direction | 6 o'clock | - |
| Color Depth | 65K/262K/16.7M | - |
| Pixel Arrangement | RGB-stripe | - |
| Backlight Type | 21 LEDs, 60mA | - |
| Surface Luminance | 430min, 500typ | cd/m ² |
| Driver IC | SSD1963 | - |
| Interface Type | MCU8/16bit | - |
| Input Voltage | 5.0 | V |
| With/Without TP | Without | - |
| Weight | TBD | g |

Note 1: RoHS compliant

Note 2: LCM weight tolerance: ± 5%.

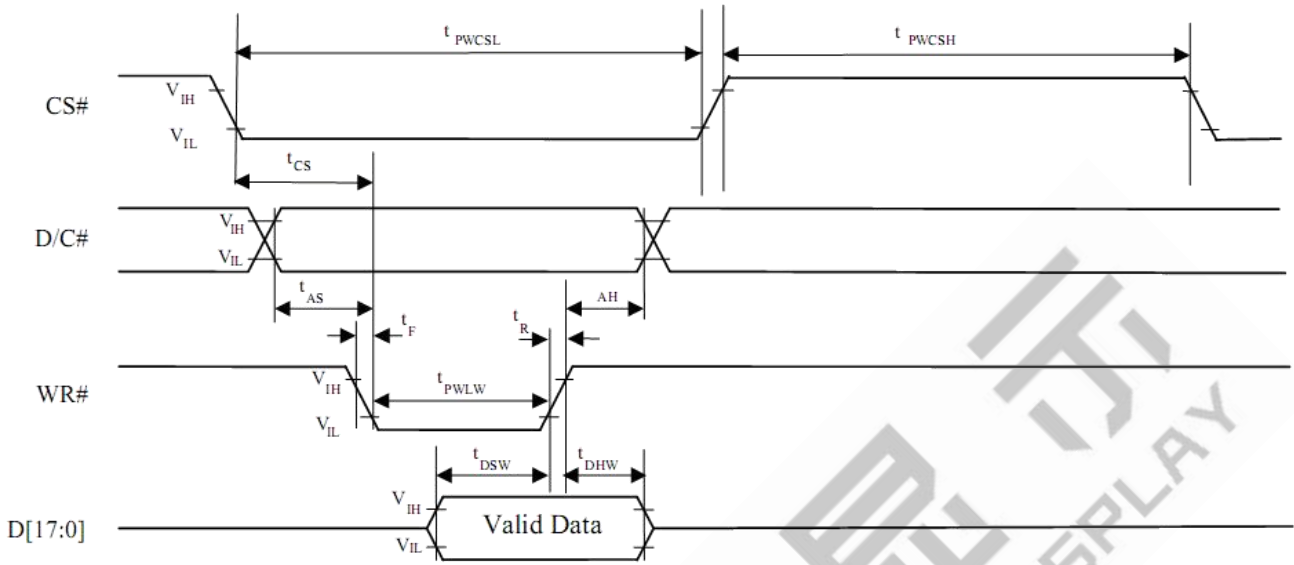
2 Product drawings



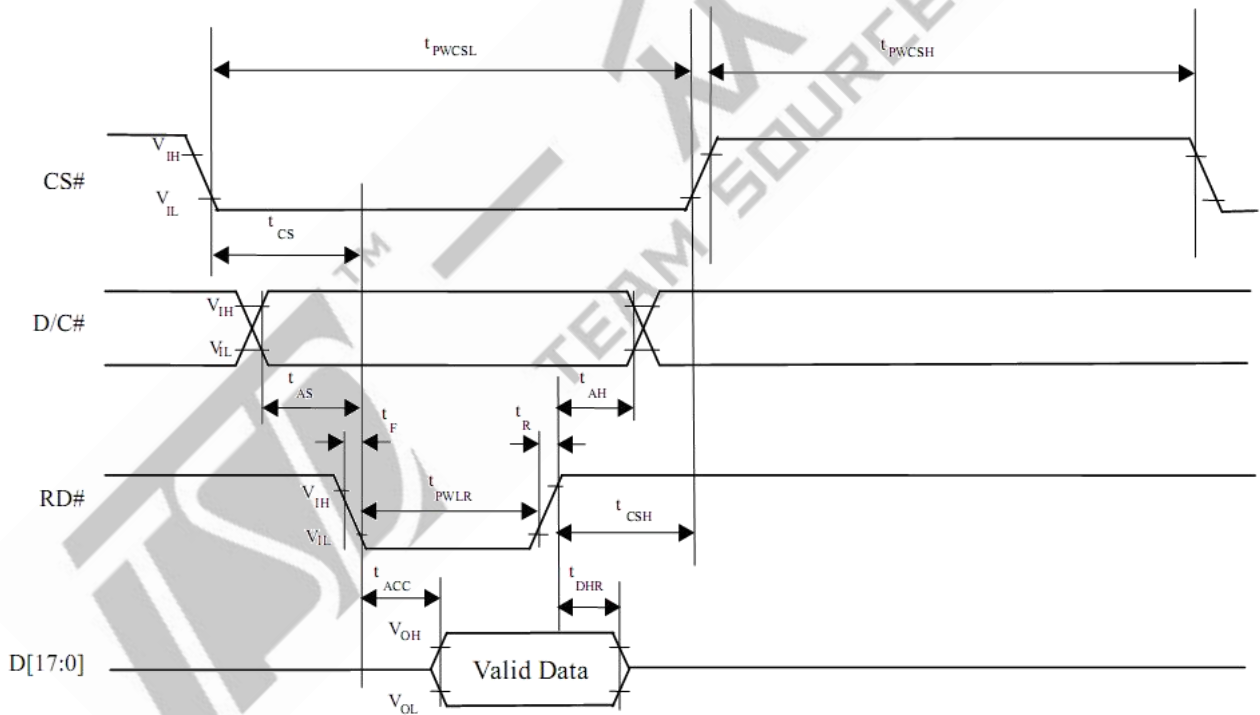
3 Interface description

| PIN NO. | Symbol | description |
|---------|----------|--|
| 1 | GND | System Ground. (0V) |
| 2 | VCC | Power supply +5.0V |
| 3 | BL_EN | Backlight enable High, Backlight ON; Low, Backlight off. |
| 4 | RS | Data/Command select |
| 5 | WR | write strobe signal |
| 6 | RD | read strobe signal |
| 7~22 | DB0~DB15 | MCU16-bit Data bus. Pins not used should be floating. |
| 23-24 | NC | No connect |
| 25 | CS | Chip select |
| 26 | RESET | Master synchronize reset |
| 27 | NC | No connect |
| 28 | NC | No connect |
| 29 | NC | No connect |
| 30 | NC | No connect |
| 31 | NC | No connect |
| 32 | DISP | Standby mode control. (Normally pull high) DISP="L", enter standby mode for power saving. Timing controller and source driver will turn off, all outputs are Hi-Z. DISP="H", normal operation. |

4 Parallel 8080-series Interface Timing



Parallel 8080-series Interface Timing Diagram (Write Cycle)

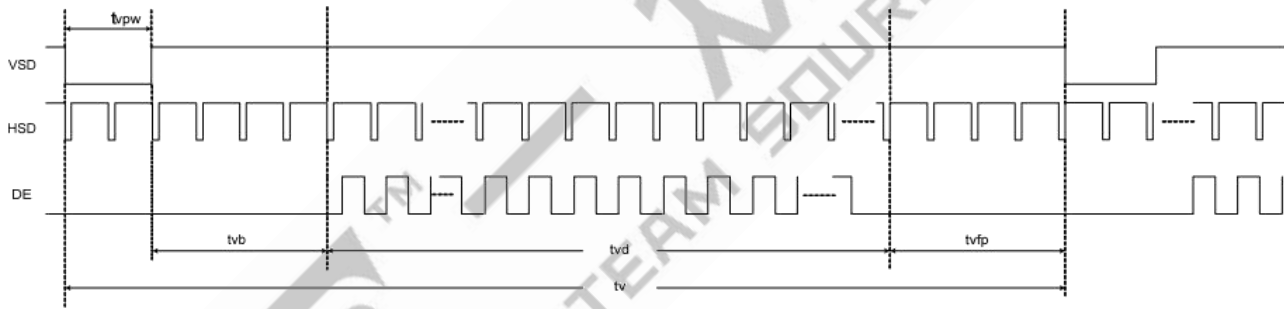


Parallel 8080-series Interface Timing Diagram (Read Cycle)

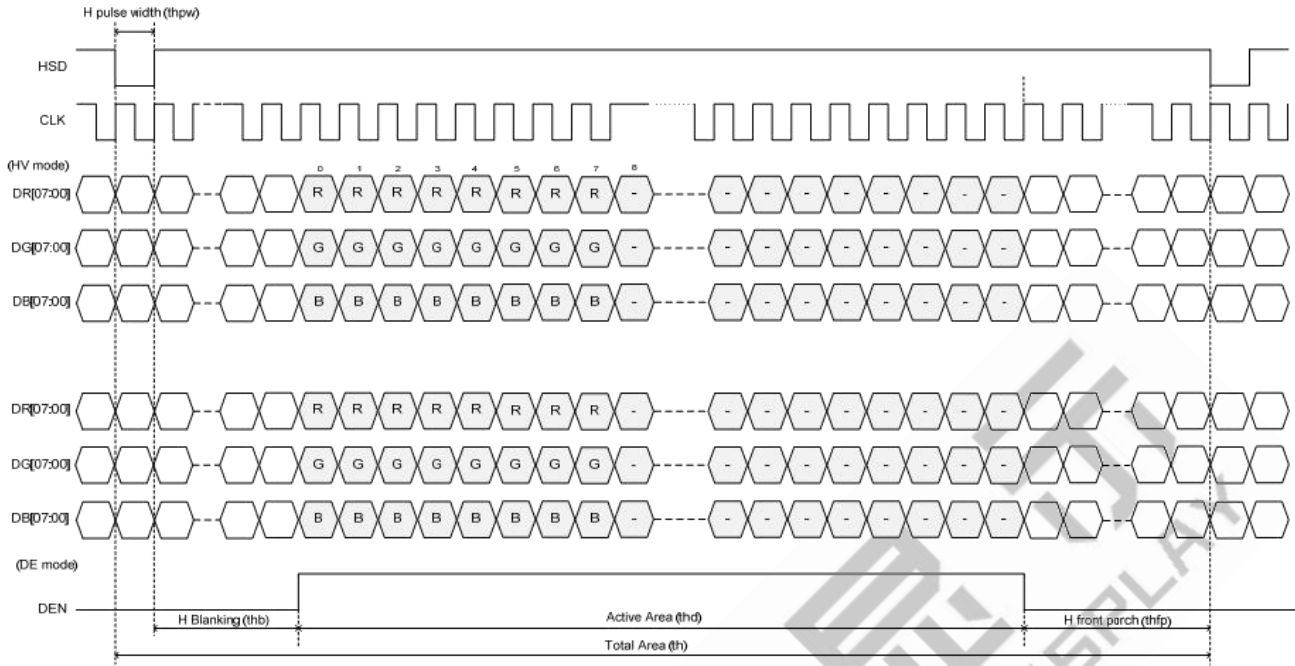
| Symbol | Parameter | Min | Typ | Max | Unit |
|-------------|--------------------------------------|--------------|------------------|-----|------|
| f_{MCLK} | System Clock Frequency* | 1 | - | 110 | MHz |
| t_{MCLK} | System Clock Period* | $1/f_{MCLK}$ | - | - | ns |
| t_{PWCSL} | Control Pulse High Width | 13 | $1.5^* t_{MCLK}$ | - | ns |
| | Control Pulse Low Width | 30 | $3.5^* t_{MCLK}$ | - | ns |
| t_{PWCSH} | Control Pulse Low Width | 13 | $1.5^* t_{MCLK}$ | - | ns |
| | Write (next write cycle) | 80 | $9^* t_{MCLK}$ | - | ns |
| | Read (next read cycle) | 80 | $9^* t_{MCLK}$ | - | ns |
| t_{AS} | Address Setup Time | 1 | - | - | ns |
| t_{AH} | Address Hold Time | 2 | - | - | ns |
| t_{DSW} | Write Data Setup Time | 4 | - | - | ns |
| t_{DHW} | Write Data Hold Time | 1 | - | - | ns |
| t_{PWLW} | Write Low Time | 12 | - | - | ns |
| t_{DHR} | Read Data Hold Time | 1 | - | - | ns |
| t_{ACC} | Access Time | 32 | - | - | ns |
| t_{PWLR} | Read Low Time | 36 | - | - | ns |
| t_R | Rise Time | - | - | 0.5 | ns |
| t_F | Fall Time | - | - | 0.5 | ns |
| t_{CS} | Chip select setup time | 2 | - | - | ns |
| t_{CSH} | Chip select hold time to read signal | 3 | - | - | ns |

* System Clock denotes external input clock (PLL-bypass) or internal generated clock (PLL-enabled)

5 LCD RGB Timing Characteristics



Horizontal input timing



| Parameter | Symbol | Value | | | Unit | Note |
|-------------------|--------|-------|-------|------|------|-----------------------------|
| Horizontal | thd | 800 | | | DCLK | |
| DCLK frequency | fclk | Min. | Typ. | Max. | MHz | |
| | | 26.47 | 27.72 | 50 | | |
| 1 Horizontal Line | th | 860 | 880 | 1040 | DCLK | thbp+thpw=88 DCLK is fixed. |
| HSD pulse width | thpw | - | 48 | - | | |
| HSD back porch | thbp | 40 | 40 | 40 | | |
| HSD front porch | thfp | 20 | 40 | 200 | | |

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|-----------------------|--------|------|------|------|------|------------------------|
| Vertical display area | tvd | 480 | | | H | |
| VSD period time | tv | 513 | 525 | 711 | H | tvpw+tvbp=32H is fixed |
| VSD pulse width | tvpw | 1 | 1 | 3 | H | |
| VSD Back Porch | tvbp | 28 | 31 | 31 | H | |
| VSD Front Porch | tvfp | 5 | 14 | 200 | H | |
| frame rate | fps | - | 60 | - | Hz | |

6 Input Pixel Data Format

| Interface | Cycle | D[23] | D[22] | D[21] | D[20] | D[19] | D[18] | D[17] | D[16] | D[15] | D[14] | D[13] | D[12] | D[11] | D[10] | D[9] | D[8] | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] | | | |
|----------------------|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|----|----|----|
| 24 bits | 1 st | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | | | |
| 18 bits | 1 st | | | | | | | R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 | | | |
| 16 bits (565 format) | 1 st | | | | | | | | | R5 | R4 | R3 | R2 | R1 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | | | |
| 16 bits | 1 st | | | | | | | | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | | | |
| | 2 nd | | | | | | | | | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | | | |
| | 3 rd | | | | | | | | | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | | | |
| 12 bits | 1 st | | | | | | | | | | | | | | | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 |
| | 2 nd | | | | | | | | | | | | | | | | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| 9 bits | 1 st | | | | | | | | | | | | | | | | | R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | | |
| | 2 nd | | | | | | | | | | | | | | | | | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 | | |
| 8 bits | 1 st | | | | | | | | | | | | | | | | | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | | |
| | 2 nd | | | | | | | | | | | | | | | | | | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | | |
| | 3 rd | | | | | | | | | | | | | | | | | | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | | |

*note: This module support 8-bit and 16-bit only.

7 Command Table

| Hex Code | Command | Description |
|----------|------------------------|---|
| 0x00 | nop | No operation |
| 0x01 | soft_reset | Software Reset |
| 0x0A | get_power_mode | Get the current power mode |
| 0x0B | get_address_mode | Get the frame buffer to the display panel read order |
| 0x0C | Reserved | Reserved |
| 0x0D | get_display_mode | The SSD1963 returns the Display Image Mode. |
| 0x0E | get_tear_effect_status | Get the Tear Effect status |
| 0x0F | Reserved | Reserved |
| 0x10 | enter_sleep_mode | Turn off the panel. This command will pull low the GPIO0. If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with command set_gpio_conf, this command will be ignored. |
| 0x11 | exit_sleep_mode | Turn on the panel. This command will pull high the GPIO0. If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with command set_gpio_conf, this command will be ignored. |
| 0x12 | enter_partial_mode | Part of the display area is used for image display. |
| 0x13 | enter_normal_mode | The whole display area is used for image display. |
| 0x20 | exit_invert_mode | Displayed image colors are not inverted. |
| 0x21 | enter_invert_mode | Displayed image colors are inverted. |
| 0x26 | set_gamma_curve | Selects the gamma curve used by the display panel. |
| 0x28 | set_display_off | Blanks the display panel |
| 0x29 | set_display_on | Show the image on the display panel |
| 0x2A | set_column_address | Set the column address |
| 0x2B | set_page_address | Set the page address |
| 0x2C | write_memory_start | Transfer image information from the host processor interface to the SSD1963 starting at the location provided by set_column_address and set_page_address |
| 0x2E | read_memory_start | Transfer image data from the SSD1963 to the host processor interface starting at the location provided by set_column_address and set_page_address |
| 0x30 | set_partial_area | Defines the partial display area on the display panel |
| 0x33 | set_scroll_area | Defines the vertical scrolling and fixed area on display area |
| 0x34 | set_tear_off | Synchronization information is not sent from the SSD1963 to the host processor |
| 0x35 | set_tear_on | Synchronization information is sent from the SSD1963 to the host processor at the start of VFP |
| 0x36 | set_address_mode | Set the read order from frame buffer to the display panel |
| 0x37 | set_scroll_start | Defines the vertical scrolling starting point |
| 0x38 | exit_idle_mode | Full color depth is used for the display panel |
| 0x39 | enter_idle_mode | Reduce color depth is used on the display panel. |
| 0x3A | Reserved | Reserved |
| 0x3C | write_memory_continue | Transfer image information from the host processor interface to the SSD1963 from the last written location |
| 0x3E | read_memory_continue | Read image data from the SSD1963 continuing after the last read_memory_continue or read_memory_start |

| Hex Code | Command | Description |
|----------|-------------------|--|
| 0x44 | set_tear_scanline | Synchronization information is sent from the SSD1963 to the host processor when the display panel refresh reaches the provided scanline |
| 0x45 | get_scanline | Get the current scan line |
| 0xA1 | read_ddb | Read the DDB from the provided location |
| 0xA8 | Reserved | Reserved |
| 0xB0 | set_lcd_mode_ | Set the LCD panel mode and resolution |
| 0xB1 | get_lcd_mode | Get the current LCD panel mode, pad strength and resolution |
| 0xB4 | set_hori_period | Set front porch |
| 0xB5 | get_hori_period | Get current front porch settings |
| 0xB6 | set_vert_period | Set the vertical blanking interval between last scan line and next LFRAME pulse |
| 0xB7 | get_vert_period | Set the vertical blanking interval between last scan line and next LFRAME pulse |
| 0xB8 | set_gpio_conf | Set the GPIO configuration. If the GPIO is not used for LCD, set the direction. Otherwise, they are toggled with LCD signals. |
| 0xB9 | get_gpio_conf | Get the current GPIO configuration |
| 0xBA | set_gpio_value | Set GPIO value for GPIO configured as output |
| 0xBB | get_gpio_status | Read current GPIO status. If the individual GPIO was configured as input, the value is the status of the corresponding pin. Otherwise, it is the programmed value. |
| 0xBC | set_post_proc | Set the image post processor |
| 0xBD | get_post_proc | Set the image post processor |
| 0xBE | set_pwm_conf | Set the image post processor |
| 0xBF | get_pwm_conf | Set the image post processor |
| 0xC0 | set_lcd_gen0 | Set the rise, fall, period and toggling properties of LCD signal generator 0 |
| 0xC1 | get_lcd_gen0 | Get the current settings of LCD signal generator 0 |
| 0xC2 | set_lcd_gen1 | Set the rise, fall, period and toggling properties of LCD signal generator 1 |
| 0xC3 | get_lcd_gen1 | Get the current settings of LCD signal generator 1 |
| 0xC4 | set_lcd_gen2 | Set the rise, fall, period and toggling properties of LCD signal generator 2 |
| 0xC5 | get_lcd_gen2 | Get the current settings of LCD signal generator 2 |
| 0xC6 | set_lcd_gen3 | Set the rise, fall, period and toggling properties of LCD signal generator 3 |
| 0xC7 | get_lcd_gen3 | Get the current settings of LCD signal generator 3 |
| 0xC8 | set_gpio0_rop | Set the GPIO0 with respect to the LCD signal generators using ROP operation. No effect if the GPIO0 is configured as general GPIO. |
| 0xC9 | get_gpio0_rop | Get the GPIO0 properties with respect to the LCD signal generators. |
| 0xCA | set_gpio1_rop | Set the GPIO1 with respect to the LCD signal generators using ROP operation. No effect if the GPIO1 is configured as general GPIO. |
| 0xCB | get_gpio1_rop | Get the GPIO1 properties with respect to the LCD signal generators. |
| 0xCC | set_gpio2_rop | Set the GPIO2 with respect to the LCD signal generators using ROP operation. No effect if the GPIO2 is configured as general GPIO. |

| Hex Code | Command | Description |
|----------|--------------------------|--|
| 0xCD | get_gpio2_rop | Get the GPIO2 properties with respect to the LCD signal generators. |
| 0xCE | set_gpio3_rop | Set the GPIO3 with respect to the LCD signal generators using ROP operation. No effect if the GPIO3 is configured as general GPIO. |
| 0xCF | get_gpio3_rop | Get the GPIO3 properties with respect to the LCD signal generators. |
| 0xD0 | set_dbc_conf | Set the dynamic back light configuration |
| 0xD1 | get_dbc_conf | Get the current dynamic back light configuration |
| 0xD4 | set_dbc_th | Set the threshold for each level of power saving |
| 0xD5 | get_dbc_th | Get the threshold for each level of power saving |
| 0xE0 | set_pll | Start the PLL. Before the start, the system was operated with the crystal oscillator or clock input |
| 0xE2 | set_pll_mn | Set the PLL |
| 0xE3 | get_pll_mn | Get the PLL settings |
| 0xE4 | get_pll_status | Get the current PLL status |
| 0xE5 | set_deep_sleep | Set deep sleep mode |
| 0xE6 | set_lshift_freq | Set the LSHIFT (pixel clock) frequency |
| 0xE7 | get_lshift_freq | Get current LSHIFT (pixel clock) frequency setting |
| 0xE8 | Reserved | Reserved |
| 0xE9 | Reserved | Reserved |
| 0xF0 | set_pixel_data_interface | Set the pixel data format of the parallel host processor interface |
| 0xF1 | get_pixel_data_interface | Get the current pixel data format settings |
| 0xFF | Reserved | Reserved |

Note: command descriptions please see SSD1963 Datasheet

8 Absolute Maximum Ratings

| PARAMETER | SYMBOL | MIN | MAX | UNIT |
|-------------------------|---------|------|----------------|------|
| Supply Voltage (Analog) | VCC~GND | -0.3 | 5.5 | V |
| Operating Temperature | TOP | -20 | 70 | ° C |
| Storage Temperature | TST | -30 | 80 | ° C |
| Humidity | RH | - | 90%(Max 60° C) | RH |

9 Electrical Characteristics

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT |
|----------------------------|--------|----------|-----|---------|------|
| Analog operating voltage | VCC | 4.5 | 5.0 | 5.5 | V |
| Logic operating voltage | VDDI | 3.0 | 3.3 | 3.6 | |
| Input Voltage ' H ' level | VIH | 0.7VDDI | - | VDDI | |
| Input Voltage ' L ' level | VIL | GND | - | 0.3VDDI | |
| Output Voltage ' H ' level | VOH | VDDI-0.4 | - | VDDI | |
| Output Voltage ' L ' level | VOL | GND | - | GND+0.4 | |

10 Backlight Driver Characteristics

| ITEM | SYMBOL | MIN | TYP | MAX | UNIT |
|-------------------|-----------------|-------|-------|-----|------|
| Input Voltage | VCC | - | 5.0 | - | V |
| Input Current | I _f | - | 260 | - | mA |
| Power consumption | W _{bl} | - | 1.3 | - | W |
| Uniformity | Avg | 75 | 80 | - | % |
| LED Life Time | - | 20000 | 30000 | - | Hrs |

Note:

- 1.The LED life time is defined as the module brightness decrease to 50% original brightness at Ta=25°C, 60%RH ±5 %.
2. The life time of LED will be reduced if LED is driven by high current, high ambient temperature and humidity conditions.
3. Typical operating life time is an estimated data.
4. Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded .Functional operation should be restricted to the conditions described under normal operating conditions.

11 LCD Optical specifications

| Item | Symbol | Condition | Specification | | | Unit | Remark |
|------------------------------|--------|--------------------|---------------|-------|-------|------|------------|
| | | | Min | Typ | Max | | |
| Response time (By Quick) | Tr+Tf | $\theta = 0^\circ$ | - | 25 | - | ms | Note 5 |
| Contrast ratio | CR | $\theta = 0^\circ$ | 400 | 500 | - | | Note 2,6 |
| Viewing angle | Top | $CR \geq 10$ | 70 | 75 | - | Deg. | Note 2,6,7 |
| | Bottom | $CR \geq 10$ | 65 | 70 | - | | |
| | Left | $CR \geq 10$ | 70 | 75 | - | | |
| | Right | $CR \geq 10$ | 70 | 75 | - | | |
| Color chromaticity (CIE1931) | Wx | $\theta = 0^\circ$ | 0.294 | 0.304 | 0.314 | | Note 3 |
| | Wy | | 0.329 | 0.339 | 0.349 | | |
| | Rx | | 0.586 | 0.601 | 0.616 | | |
| | Ry | | 0.309 | 0.324 | 0.339 | | |
| | Gx | | 0.291 | 0.301 | 0.311 | | |
| | Gy | | 0.552 | 0.567 | 0.582 | | |
| | Bx | | 0.133 | 0.143 | 0.153 | | |
| | By | | 0.159 | 0.174 | 0.189 | | |
| NTSC | | | - | 50% | - | | Note 3 |

Note 1: Ambient temperature = 25°C.

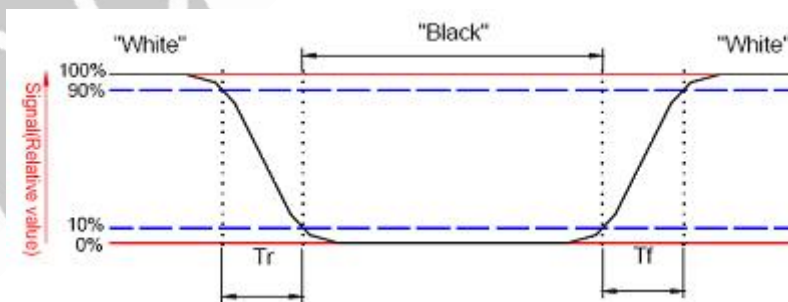
Note 2: To be measured with a viewing cone of 2° by Topcon luminance meter BM-7.

Note 3: To be measured with Otsuta chromaticity meter LCF-2100M, CF only measure under C light simulation.

Note 4: Shipping status is cell without polarizer. Transmittance of Specification is cell with polarizer. The tolerance of Transmittance is ±10%.

Note 5: Definition of response time:

The output signals of TRD-100 are measured when the input signals are changed to “White” (falling time) and from “White” to “Black” (rising time), respectively. The interval is between the 10% and 90% of amplitudes. Refer to figure as below.

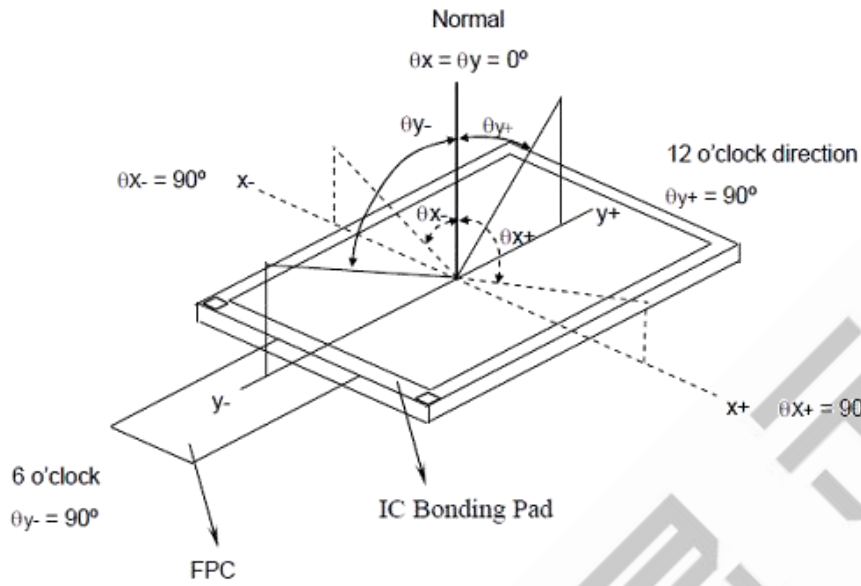


Note 6: Definition of contrast ratio:

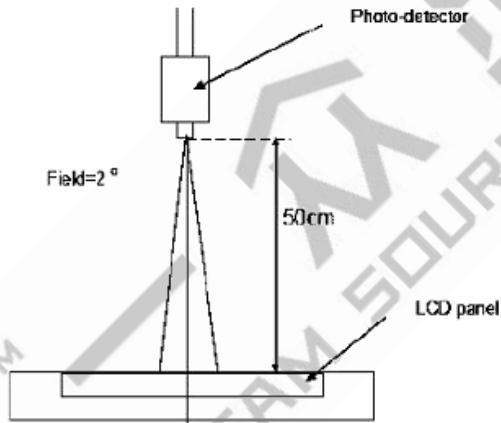
Contrast ratio is calculated by the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

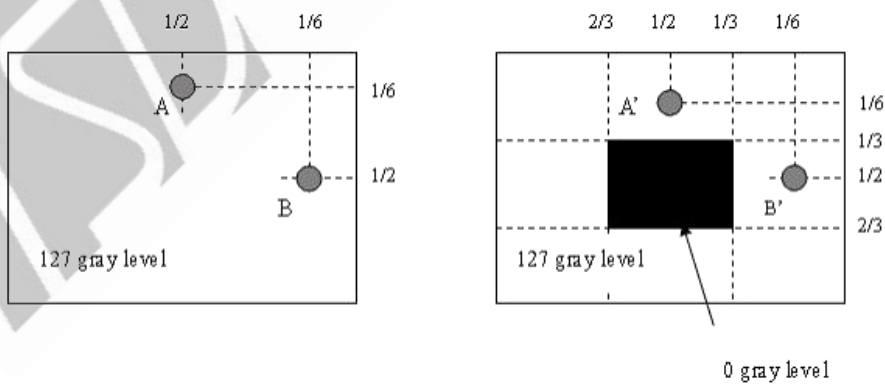
Note 7: Definition of viewing angle



Note 8: Optical characteristic measurement setup.



Note 9:



$1 LA-LA' / LA \times 100\% = 2\% \text{ max.}$, LA and LA' are brightness at location A and A'.
 $1 LB-LB' / LB \times 100\% = 2\% \text{ max.}$, LB and LB' are brightness at location B and B'.

12 Touch Panel specifications

| ITEM | VALUE | | | UNIT | REMARK |
|-----------------------|-----------|-----|--------|---------|---------------------------|
| | Min | Typ | Max | | |
| Linearity | - | - | 1.5 | % | Analog X and Y directions |
| Terminal Resistance | 350 | - | 950 | Ω | x |
| | 150 | - | 500 | | y |
| Insulation Resistance | 20 | - | - | MΩ | DC 25V |
| Voltage | - | 5 | - | V | DC |
| Transparency | 76 | - | - | % | - |
| Operation Force | 80 | - | 120 | g | - |
| Endurance | 1,000,000 | - | - | Touches | 100g Operation Force |
| | - | - | 30,000 | Slides | |
| Surface Hardness | 3 | - | - | H | - |

13 RELIABILITY TEST

| NO. | TEST ITEM | TEST CONDITION | INSPECTION AFTER TEST |
|-----|------------------------------|--|--|
| 1 | High Temperature Storage | 80±2°C/96 hours | Inspection after 2~4 hours storage at room temperature and humidity. The condensation is not accepted. The sample shall be free from defects: 1. Air bubble in the LCD 2. Seal leak 3. Non-display 4. Missing segments 5. Glass crack |
| 2 | Low Temperature Storage | -30±2°C/96 hours | |
| 3 | High Temperature Operating | 70±2°C/96 hours | |
| 4 | Low Temperature Operating | -20±2°C/96 hours | |
| 5 | Temperature Cycle | -30±2°C ~ 25~ 80± 2°C × 10 cycles (30 min.) (5min.) (30min.) | |
| 6 | Damp Proof Test | 60°C ±5°C × 90%RH/96 hours | |
| 7 | Vibration Test | Frequency 10Hz~55Hz Stroke: 1.5mm Sweep: 10Hz~150 Hz~10Hz 2 hours For each direction of X, Y, Z | |
| 8 | Shock Test | Half-sine, wave, 300m/s | |
| 9 | Packing Drop Test | Height: 80 cm 1 corner, concrete floor | |
| 10 | Electrostatic Discharge Test | C=150pF, R=330 Ω Air: ±8KV 150pF/330Ω 30 times Contact: ±4KV,20 times | |

14 Suggestions for using LCD modules

14.1 Handling of LCM

1. The LCD screen is made of glass. Don't give excessive external shock, or drop from a high place.
2. If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.
3. Don't apply excessive force on the surface of the LCM.
4. If the surface is contaminated, clean it with soft cloth. If the LCM is severely contaminated, use Isopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer. The following solvents is especially prohibited: water , ketone Aromatic solvents etc.
5. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
6. Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
7. Don't disassemble the LCM.
8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - Be sure to ground the body when handling the LCD modules.
 - Tools required for assembling, such as soldering irons, must be properly grounded.
 - To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
 - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
9. Do not alter, modify or change the the shape of the tab on the metal frame.
10. Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
11. Do not damage or modify the pattern writing on the printed circuit board.
12. Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector
13. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
14. Do not drop, bend or twist LCM.

14.2 Storage

1. Store in an ambient temperature of 5 to 45 C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.
2. Storage in a clean environment, free from dust, active gas, and solvent.
3. Store in antistatic container.

