

NHD-7.0-800480EF-ASXN#-T

TFT (Thin-Film-Transistor) Color Liquid Crystal Display Module

| | |
|---------|---------------------------------|
| NHD- | Newhaven Display |
| 7.0- | 7.0" Diagonal |
| 800480- | 800x480 Pixels |
| EF- | Model |
| A- | Built-in Driver / No Controller |
| S- | Sunlight Readable |
| X- | TFT |
| N- | TN, Wide Temperature |
| #- | RoHS Compliant |
| T- | Resistive Touch Panel |

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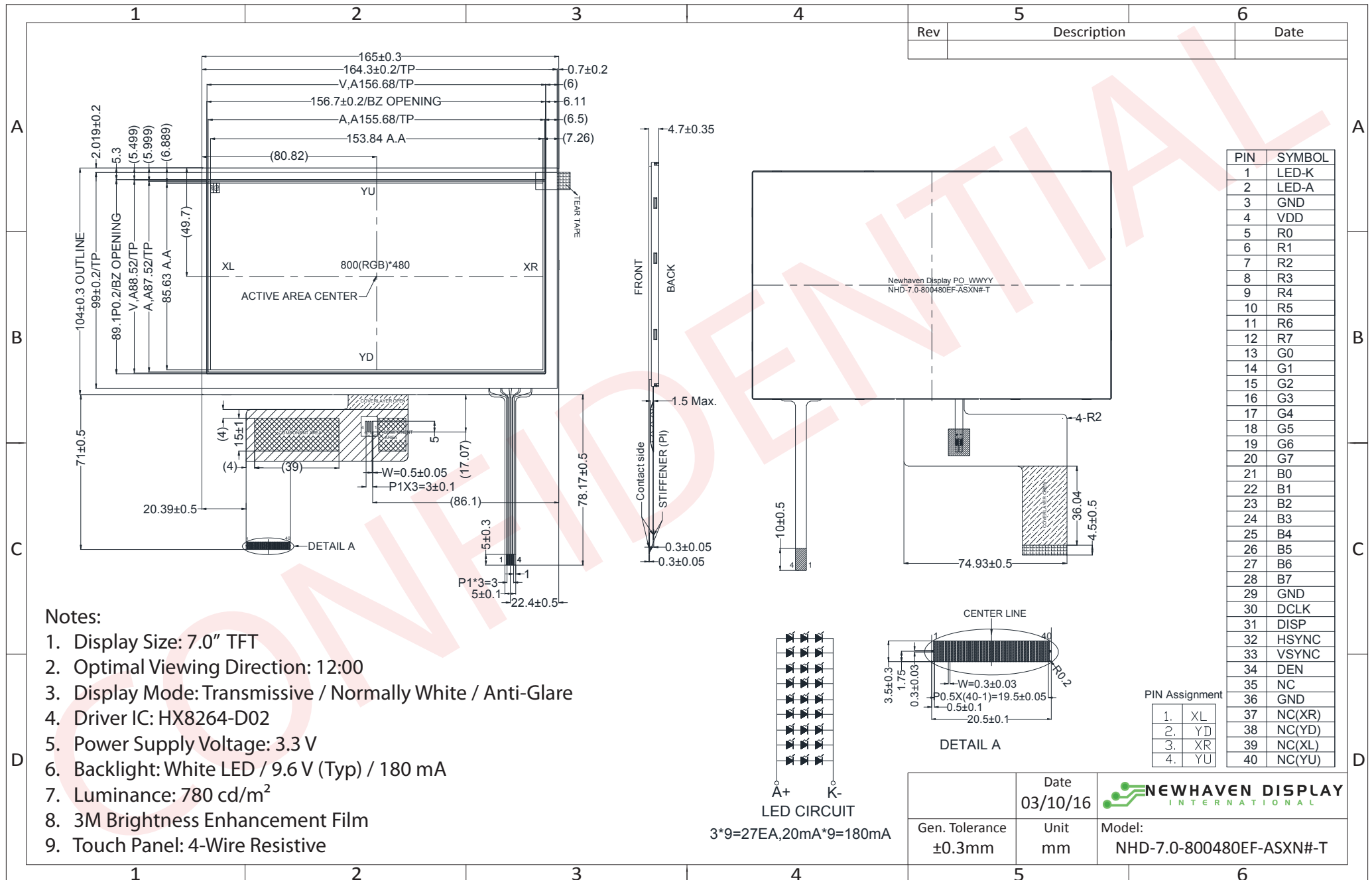
Document Revision History

| Revision | Date | Description | Changed by |
|----------|---------|---|------------|
| 0 | 3/10/16 | Initial Release | SB |
| 1 | 7/5/16 | Added Chromaticity, Updated Touch Panel Characteristics | SB |

Functions and Features

- 800x480 resolution
- LED backlight
- 24-bit digital RGB interface
- 16.7M colors
- Sunlight Readable
- 4-wire resistive Touch Panel

Mechanical Drawing



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Pin Description

TFT:

| Pin No. | Symbol | Connection | Function Description |
|---------|---------|--------------|--|
| 1 | LED_K | Power Supply | Backlight Cathode (Ground) |
| 2 | LED_A | Power Supply | Backlight Anode (180mA @ 9.6V) |
| 3 | GND | Power Supply | Ground |
| 4 | VDD | Power Supply | Supply Voltage for LCD and logic (+3.3V) |
| 5-12 | [R0-R7] | MPU | Red Data signals |
| 13-20 | [G0-G7] | MPU | Green Data signals |
| 21-28 | [B0-B7] | MPU | Blue Data signals |
| 29 | GND | Power Supply | Ground |
| 30 | DCLK | MPU | Dot data Clock |
| 31 | DISP | MPU | Display on/off DISP=1:Display on |
| 32 | HSYNC | MPU | Line synchronization signal |
| 33 | VSYNC | MPU | Frame synchronization signal |
| 34 | DEN | MPU | Data Enable signal |
| 35 | NC | - | No Connect |
| 36 | GND | Power Supply | Ground |
| 37 | NC(XR) | - | No Connect |
| 38 | NC(YD) | - | No Connect |
| 39 | NC(XL) | - | No Connect |
| 40 | NC(YU) | - | No Connect |

Recommended connector: 0.5mm pitch 40-Conductor FFC. Molex p/n: 54104-4031 (top contact)

Resistive Touch Panel:

| Pin No. | Symbol | Connection | Function Description |
|---------|--------|------------------|----------------------|
| 1 | XL | Touch Controller | Touch Panel – Left |
| 2 | YD | Touch Controller | Touch Panel – Down |
| 3 | XR | Touch Controller | Touch Panel – Right |
| 4 | YU | Touch Controller | Touch Panel – Up |

Recommended connector: 1.0mm pitch 4-Conductor FFC. Molex p/n: 52207-0485 (top contact)

Driver Information

Built-in HX8264-D02 Source Driver: http://www.newhavendisplay.com/app_notes/HX8264-D02.pdf

Built-in HX8664-B Gate Driver: http://www.newhavendisplay.com/app_notes/HX8664-B.pdf

Electrical Characteristics

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------------|------------------|--|----------------------|--------|----------------------|------|
| Operating Temperature Range | T _{OP} | Absolute Max | -20 | - | +70 | °C |
| Storage Temperature Range | T _{ST} | Absolute Max | -30 | - | +80 | °C |
| Supply Voltage | V _{DD} | - | 3.0 | 3.3 | 3.6 | V |
| Supply Current | I _{DD} | V _{DD} = 3.3V, 25°C | 60 | 85 | 120 | mA |
| "H" Level Input | V _{IH} | - | 0.7*V _{DD} | - | V _{DD} | V |
| "L" Level Input | V _{IL} | - | V _{SS} | - | 0.3*V _{DD} | V |
| "H" Level Output | V _{OH} | - | V _{DD} -0.4 | - | - | V |
| "L" Level Output | V _{OL} | - | V _{SS} | - | V _{SS} +0.4 | V |
| Backlight Supply Voltage | V _{LED} | - | 8.7 | 9.6 | 9.9 | V |
| Backlight Supply Current | I _{LED} | V _{LED} = 9.6V | - | 180 | - | mA |
| Backlight Lifetime* | - | I _{LED} = 180 mA T _{OP} = 25° C | 20,000 | 50,000 | - | Hrs. |

*Backlight Lifetime is rated as Hours until **half-brightness**, under normal operating conditions.

Optical Characteristics

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | |
|------------------------|---------------------------------|---------------------------|------|-------|-------|-------------------|---|
| Optimal Viewing Angles | Top | CR ≥ 10 | - | 60 | - | ° | |
| | Bottom | | - | 50 | - | ° | |
| | Left | | - | 60 | - | ° | |
| | Right | | - | 60 | - | ° | |
| Contrast Ratio | CR | - | - | 400 | - | - | |
| Luminance | L _V | I _{LED} = 180 mA | 620 | 780 | - | cd/m ² | |
| Response Time | T _R + T _F | T _{OP} = 25°C | - | 25 | 35 | ms | |
| Chromaticity | Red | X _R | - | 0.533 | 0.583 | 0.633 | - |
| | | Y _R | - | 0.293 | 0.343 | 0.393 | - |
| | Green | X _G | - | 0.279 | 0.329 | 0.379 | - |
| | | Y _G | - | 0.576 | 0.626 | 0.676 | - |
| | Blue | X _B | - | 0.102 | 0.152 | 0.202 | - |
| | | Y _B | - | 0.092 | 0.142 | 0.192 | - |
| | White | X _W | - | 0.254 | 0.302 | 0.352 | - |
| | | Y _W | - | 0.328 | 0.378 | 0.428 | - |

Touch Panel Characteristics

| Item | Min. | Typ. | Max. | Unit |
|------------------------------|-----------|------|------|------------|
| Linearity | -3 | - | 3 | % |
| Terminal Resistance – X-Axis | 50 | - | 400 | Ω |
| Terminal Resistance – Y-Axis | 350 | - | 1100 | Ω |
| Insulation Resistance | 20 | - | - | MΩ |
| Operating Voltage | - | - | 5 | V |
| Chattering | - | - | 15 | ms |
| Activation Force | 30 | - | 100 | g |
| Pen Writing Durability | 50,000 | - | - | Characters |
| Pitting Durability | 1,000,000 | - | - | Touches |
| Surface Hardness | 3 | - | - | H |

Timing Characteristics

| Parameter | Symbol | Spec. | | | Unit |
|------------------------|-----------|-------|------|------|------|
| | | Min. | Typ. | Max. | |
| HS setup time | T_{hst} | 8 | - | - | ns |
| HS hold time | T_{hhd} | 8 | - | - | ns |
| VS setup time | T_{vst} | 8 | - | - | ns |
| VS hold time | T_{vhd} | 8 | - | - | ns |
| Data setup time | T_{dsu} | 8 | - | - | ns |
| Data hold time | T_{dhd} | 8 | - | - | ns |
| DE setup time | T_{esu} | 8 | - | - | ns |
| DE hold time | T_{ehd} | 8 | - | - | ns |
| VDD Power On Slew rate | T_{POR} | - | - | 20 | ms |
| RSTB pulse width | T_{Rst} | 10 | - | - | us |
| CLKIN cycle time | T_{cph} | 20 | - | - | ns |
| CLKIN pulse duty | T_{cwh} | 40 | 50 | 60 | % |
| Output stable time | T_{sst} | - | - | 6 | us |

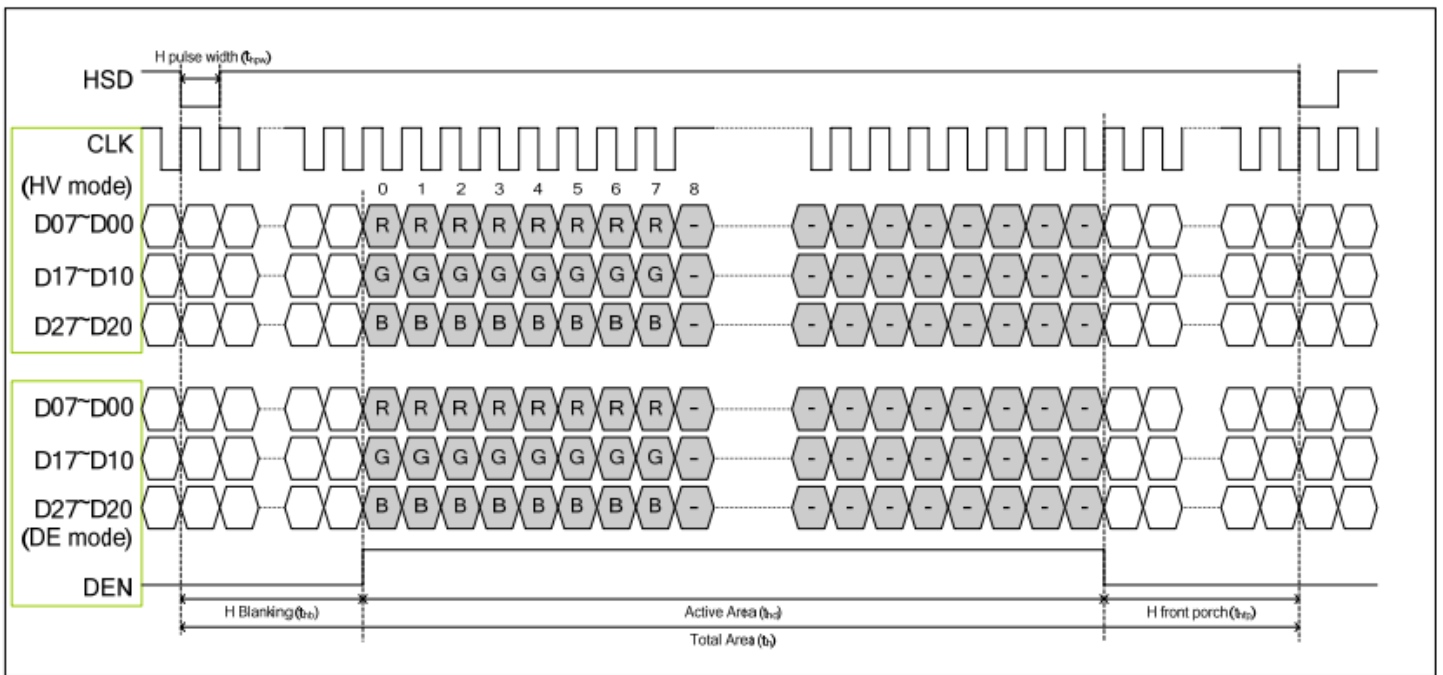
Horizontal Timing

| Parameter | Symbol | Spec. | | | Unit |
|--------------------------|--------|-------|------|------|------|
| | | Min. | Typ. | Max. | |
| Horizontal Display Area | thd | 800 | | | DCLK |
| DCLK frequency | fclk | - | 30 | 50 | MHz |
| One Horizontal Line | th | 889 | 928 | 1143 | DCLK |
| HS pulse width | thpw | 1 | 48 | 255 | DCLK |
| HS Back Porch (Blanking) | thb | 88 | | | DCLK |
| HS Front Porch | thfp | 1 | 40 | 255 | DCLK |
| DE mode Blanking | th-thd | 85 | 128 | 512 | DCLK |

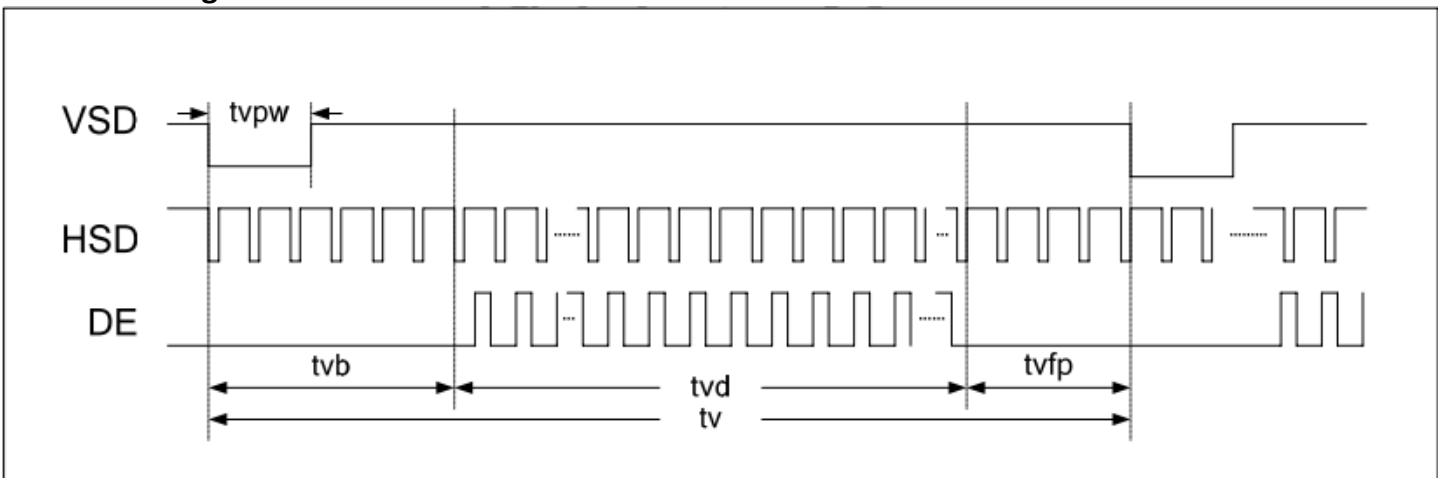
Vertical Timing

| Parameter | Symbol | Spec. | | | Unit |
|--------------------------|--------|-------|------|------|-------|
| | | Min. | Typ. | Max. | |
| Vertical Display Area | tvd | 480 | | | T_H |
| VS period time | tv | 513 | 525 | 767 | T_H |
| VS pulse width | tvpw | 3 | 3 | 255 | T_H |
| VS Back Porch (Blanking) | tvb | 32 | | | T_H |
| VS Front Porch | tvfp | 1 | 13 | 255 | T_H |
| DE mode Blanking | tv-tvd | 4 | 45 | 255 | T_H |

Horizontal Timing



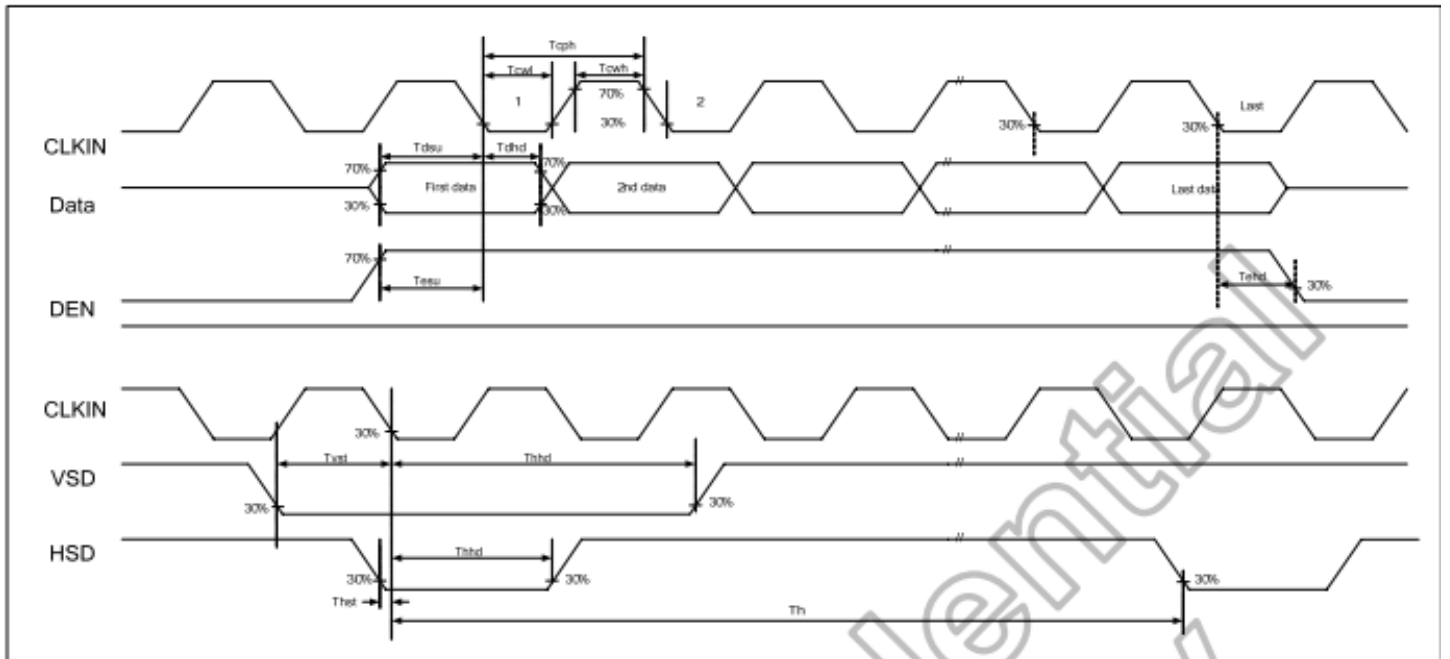
Vertical Timing



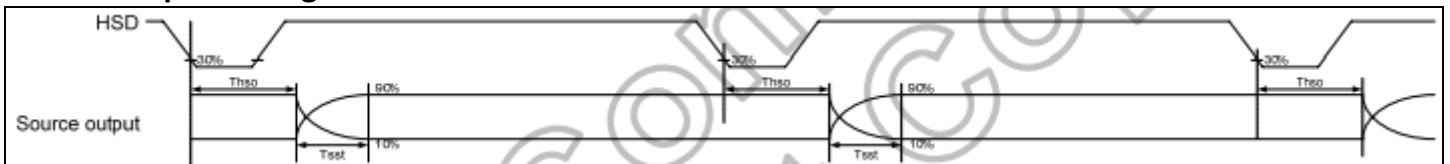
Parallel 24-bit RGB mode

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--------------------------------|--------|------|------|------|-------|---------------|
| CLKIN Frequency | Fclk | - | 40 | 50 | MHz | VDD=3.0V~3.6V |
| CLKIN Cycle Time | Tclk | 20 | 25 | - | ns | - |
| CLKIN Pulse Duty | Tcwh | 40 | 50 | 60 | % | Tclk |
| Time from HSD to Source Output | Thso | | 64 | | CLKIN | - |
| Time from HSD to LD | Thld | | 64 | | CLKIN | - |
| Time from HSD to STV | Thstv | | 2 | | CLKIN | - |
| Time from HSD to CKV | Thckv | | 20 | | CLKIN | - |
| Time from HSD to OEV | Thoev | | 4 | | CLKIN | - |
| LD Pulse Width | Twld | | 10 | | CLKIN | - |
| CKV Pulse Width | Twckv | | 66 | | CLKIN | - |
| OEV Pulse Width | Twoev | | 74 | | CLKIN | - |

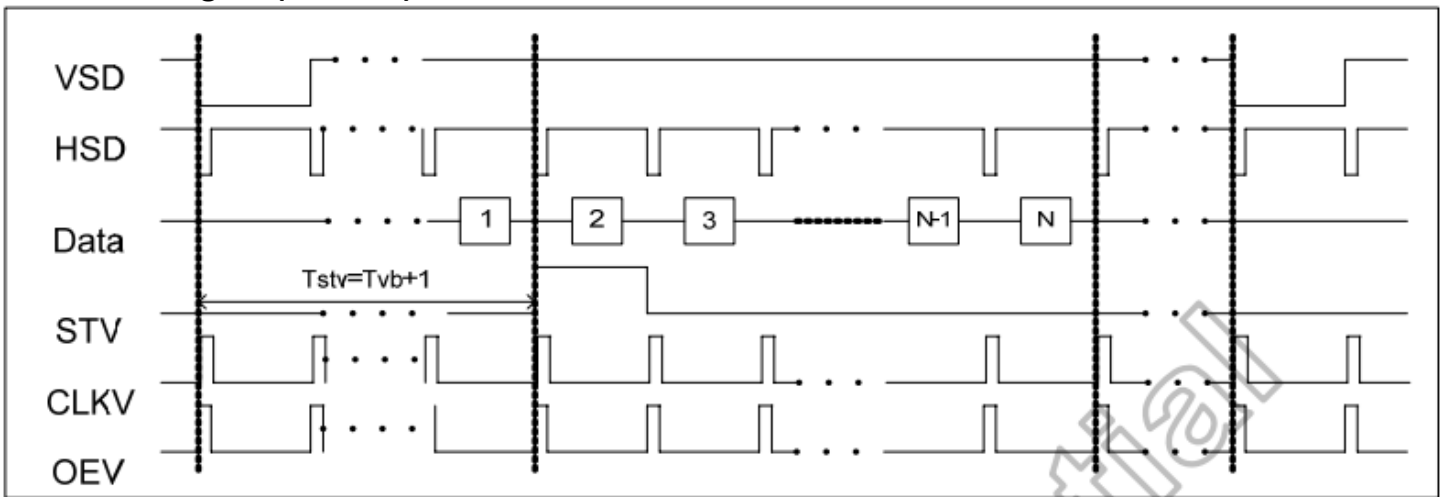
Input Clock and Data Timing



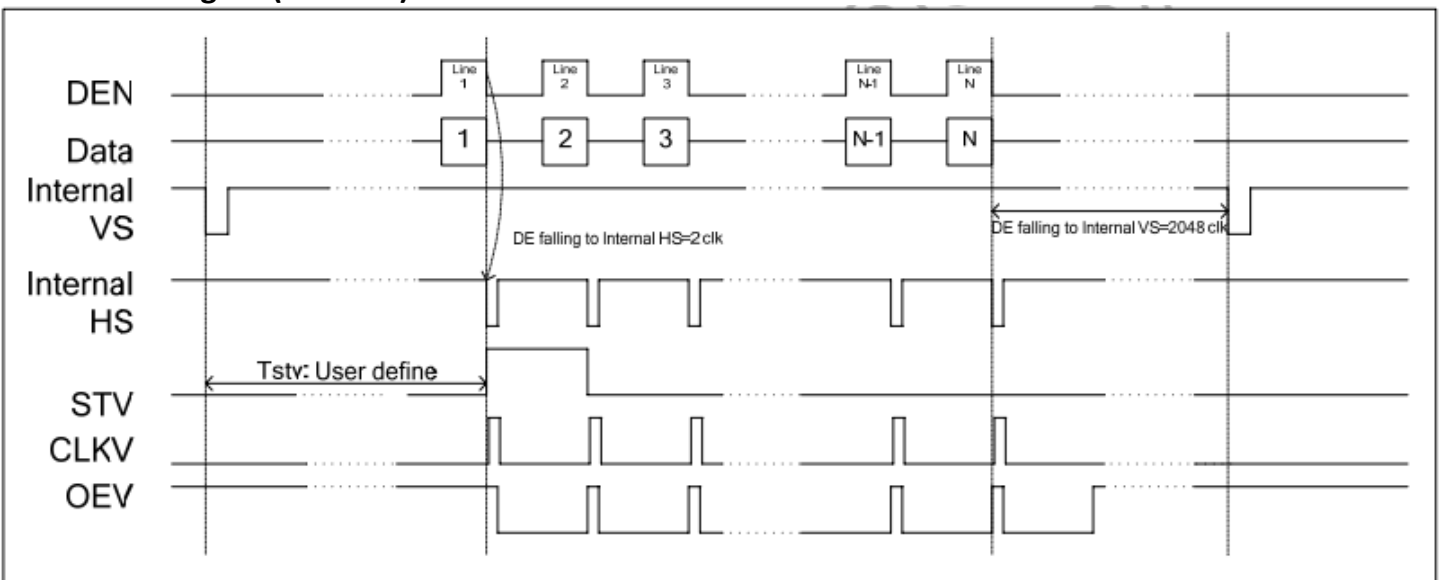
Source Output Timing



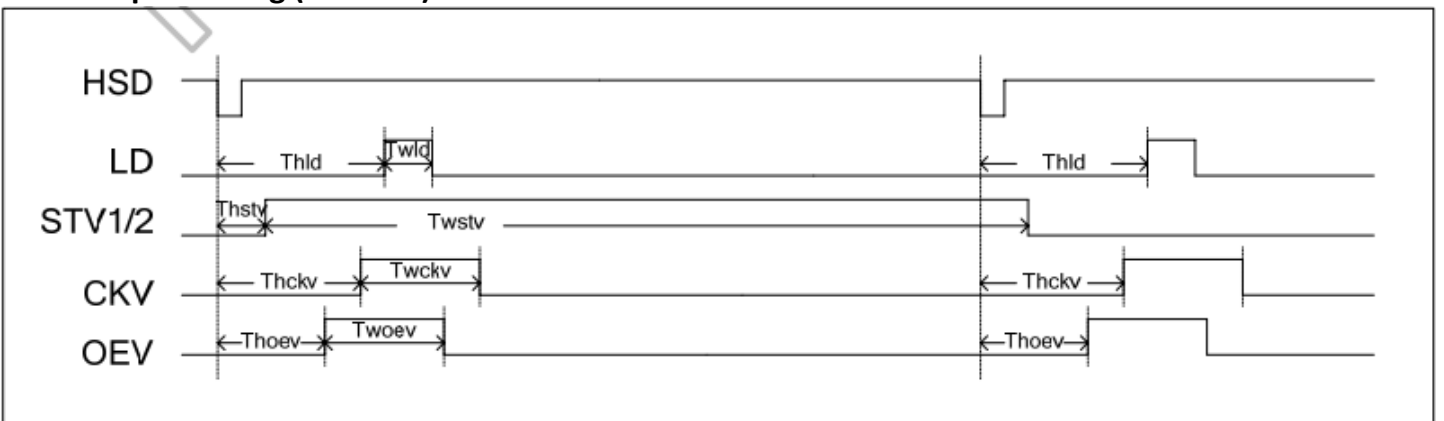
Vertical Timing HV (Cascade)



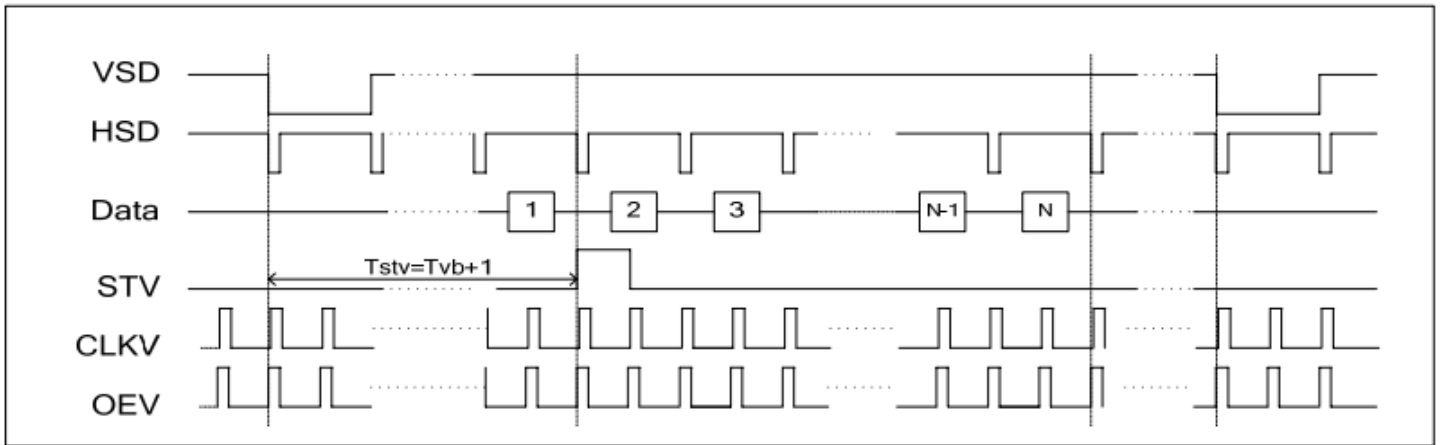
Vertical Timing DE (Cascade)



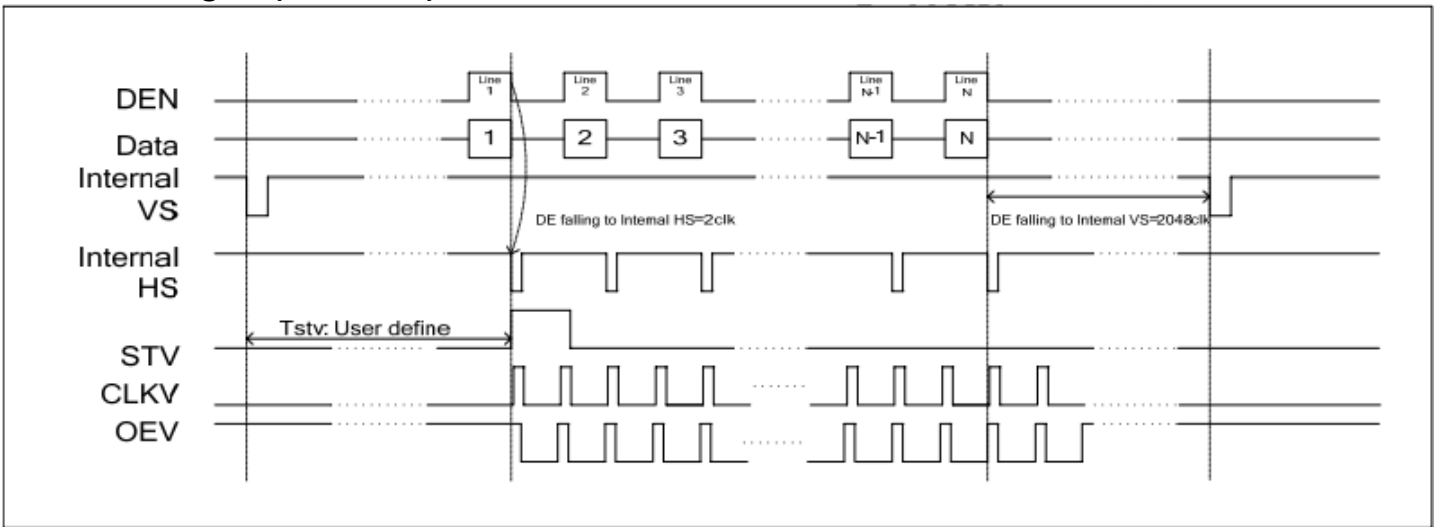
Gate Output Timing (Cascade)



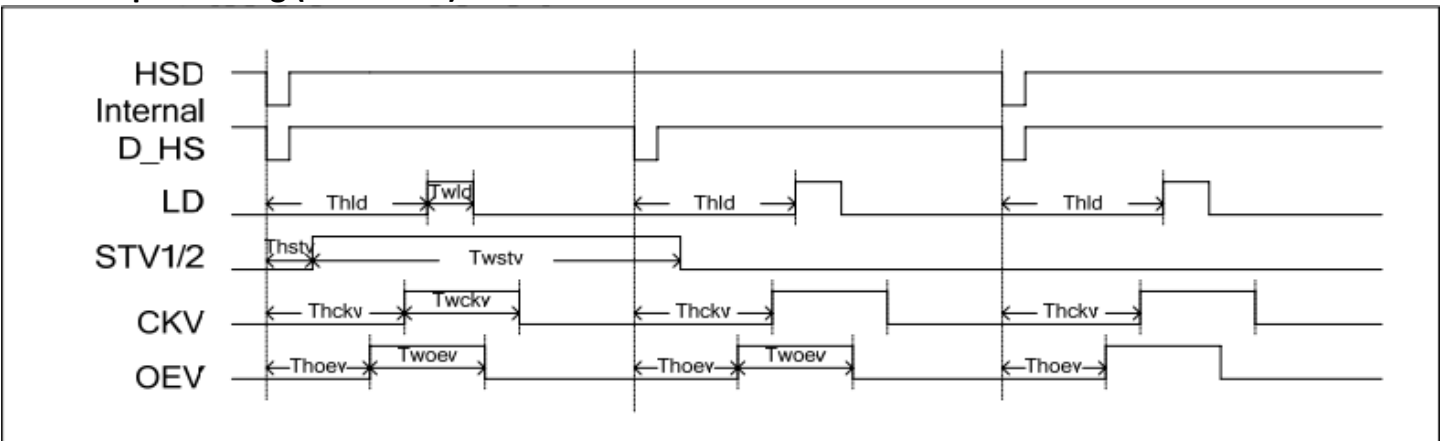
Vertical Timing HV (Dual Gate)



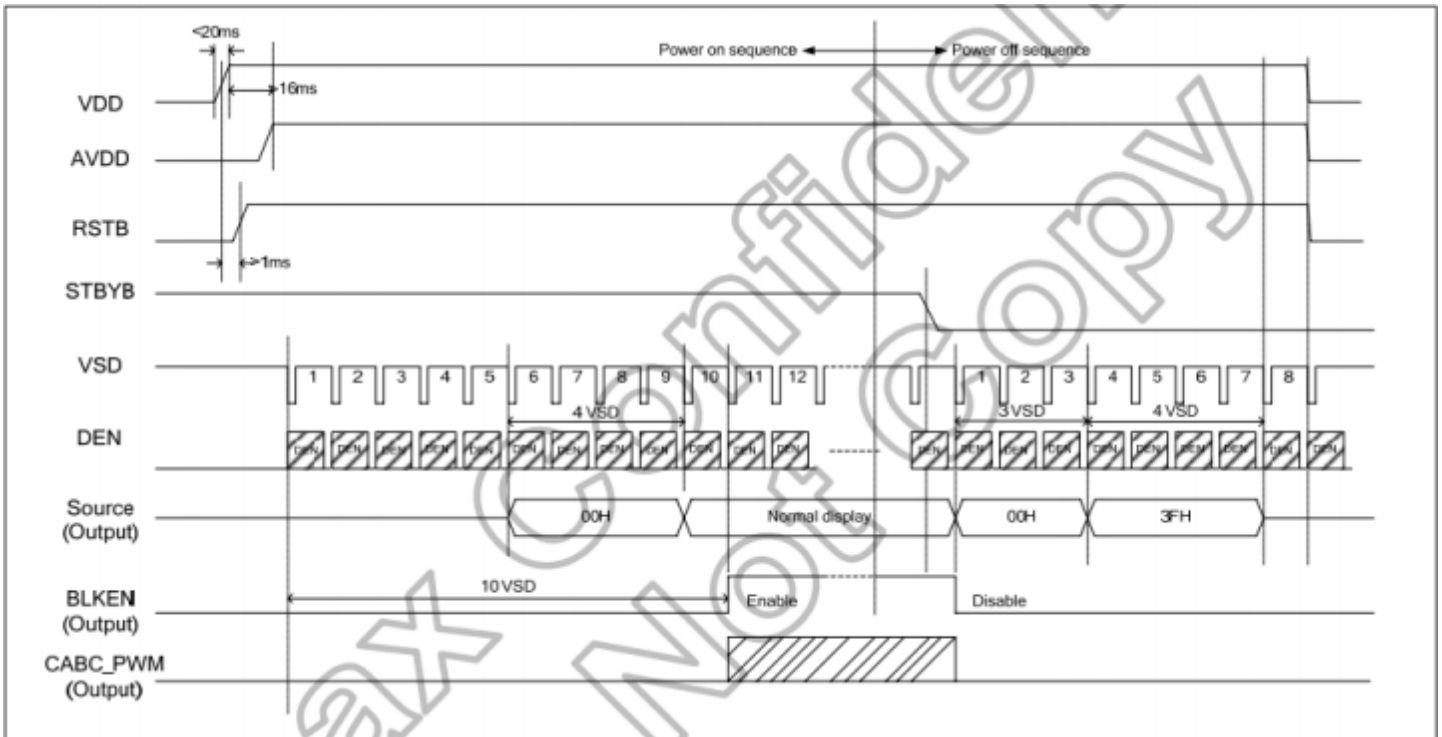
Vertical Timing DE (Dual Gate)



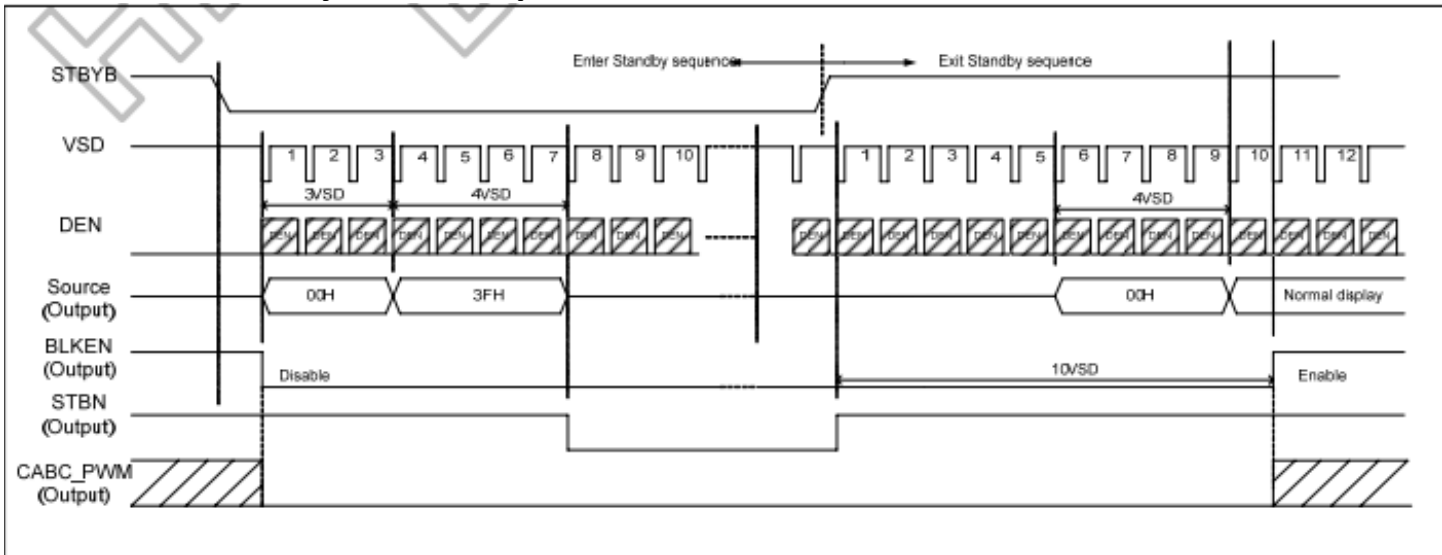
Gate Output Timing (Dual Gate)



Power ON/OFF Sequence



Enter/Exit Standby Mode Sequence



Quality Information

| Test Item | Content of Test | Test Condition | Note |
|---------------------------------------|---|---|------|
| High Temperature storage | Endurance test applying the high storage temperature for a long time. | +80°C , 96hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature for a long time. | -30°C , 96hrs | 1,2 |
| High Temperature Operation | Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time. | +70°C, 96hrs | 2 |
| Low Temperature Operation | Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time. | -20°C , 96hrs | 1,2 |
| High Temperature / Humidity Operation | Endurance test applying the electric stress (voltage & current) and the high thermal with high humidity stress for a long time. | +50°C , 90% RH , 96hrs | 1,2 |
| Thermal Shock resistance | Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress. | -30°C, 30min -> 80°C, 30min, Change time: 5min, 10 cycles | |
| Vibration test | Endurance test applying vibration to simulate transportation and use. | 10-55Hz , 1.5mm amplitude. 60 sec in each of 3 directions X,Y,Z For 15 minutes | 3 |
| Static electricity test | Endurance test applying electric static discharge. | VS=800V, RS=1.5kΩ, CS=100pF One time | |

Note 1: No condensation to be observed.

Note 2: Conducted after 4 hours of storage at 25°C, 0%RH.

Note 3: Test performed on product itself, not inside a container.

Precautions for using LCDs/LCMs

See Precautions at www.newhavendisplay.com/specs/precautions.pdf

Warranty Information

See Terms and Conditions at http://www.newhavendisplay.com/index.php?main_page=terms