

Product Usage Guidelines

IN GENERAL

1. Always follow ESD-Safe handling techniques.
2. Inspect display products prior to usage. If defective, then leave manufacturer's plastic liners on display, do not remove.
3. Cosmetic defects are only warranted with original plastic liners and no customer assembled materials added to product.
4. Polarizers scratched due to mishandling are not considered cosmetic, rather this is considered customer-induced handling damage.
5. Wear gloves or finger cots to prevent contamination of electrical contacts or glass surfaces.
6. Always use devices within the rated voltage and current limitations. Powering beyond these specifications will result in irreparable damage.
7. Always follow ventilation requirements for soldering

DESIGNING THE END-CUSTOMER PRODUCT

1. When available, use the Newhaven provided 3D part files for optimal design consideration.
2. The product design should include slack to allow for proper FPC (flex cable) insertion and routing. Designs that inherently involve tightly positioned flex cables should be avoided. This places too much tension on the cable/connector and may contribute to reliability issues.
3. Flex (FPC) cables require 1mm bend radius. Creased FPC's are indicative of customer abuse.
4. When handling of displays, never apply pressure (or squeeze) the glass area.
5. When handling flex cables never allow for contamination of the "golden finger" area. High reliability assembly keeps fingers clean and avoids hand-oil contamination.
6. Never perform hot-swaps (inserting/removing displays into powered ON devices) as this may cause corruption. This may also cause an EOS degradation event.
7. Never route the flex cables through housing openings that do not offer enough edge clearance. Rubbing (even through one-time drop events) may cause damage to the flex cable.
8. Never apply stiffening tapes (like non-conductive Kapton) to the flex cables. When stress is applied to the cable (for instance during drop testing), the stress will likely be accommodated in the region where the tapes end. This undue stress often shows as flex cable tearing. Once torn, a flex cable is no longer able to conduct signals as intended and is defective. Torn flex cables are not covered by the warranty.
9. Always try to use MOLEX original connectors. These connectors are designed to accommodate finger width variations (as normally might be expected) and apply well-specified holding forces to the cable. These connectors allow for the best electrical connections to be made and maintained.
10. When inserting FPC cables into the MOLEX connectors train your assembly operators the proper techniques.

- a. Cables should enter connectors squarely WITHOUT flex cable buckling during the insertion. Buckling (a momentary light folding of the cable) should always be avoided.
 - b. Connectors should then be locked using the tabs on both sides of the connector.
 - c. Following insertion an inspection is recommended that insertion instructions have been properly followed.
 - d. In the event of failure, consider removing the flex cable, re-inserting, and re-testing.
 - e. High reliability designs also include the application of kapton tape overlapping slightly the connector and the flex cable, aiding to prevent long term separation.
11. Never remove flex cables from connectors without first unlocking the holding tabs. Severe golden finger scratch marks are an indicator that cables were violently removed from locked connectors. Units with this type of damage are not covered by the warranty.
12. These products are constructed of glass. Always avoid undue stress that may be introduced. Product stress may be introduced when mounting of the display within the product housings. Uneven torques applied across the glass surface may result in glass breakage.
13. Preventing uneven stress and product torques require consideration of assembly techniques.
- a. Screw tightening should be a 2-step process
 - b. Best practices include loose hand-tightening screws first to provide for best levelled product installation.
 - c. Only once all screws are hand-tightened, then in an opposite corner sequencing pattern tighten the mounting screws.
 - d. Consider the usage of locking washers to minimize screw force requirements.
 - e. Never over tighten mounting screws.
 - f. Never use electric/pneumatic screwdrivers. This may also result in cross-threading of inserts. Difficult torque calibration methods are often not followed.
 - g. Never use screws that are too long that may interfere with the display product or overlays if used.
14. Liquid cleaning products should always be avoided. Liquids may seep into the glass and/or backlight assembly and cause uneven lighting. Always consider a NO-CLEAN assembly process instead. Liquid damage is not covered by the warranty.
15. Potting agents permanently holding the product in place should be considered as liquids and should be avoided.
- a. Prior to hardening the liquids may cause display damage.
 - b. After hardening, the agents may subject the display, cables, and components to high levels of trapped humidity potentially affecting reliability. The usage of RTV as a potting agent is not recommended.
16. Never apply force to the backside of the product. Force applied by other components will appear as display dark spots and cannot be repaired. Unexpected component movements (such as a drop test) may apply backside pressure to the display and should be avoided.
17. Both displays and touch panels utilize the ACF bonding techniques. This involves the usage of double-sided electrically conductive tapes bonding flex cables to glass structures. Once bonded, avoid pulling on the flex cables. General guidelines include limiting loads to <1 Kg. Long-term

forces exceeding this may result in damaged bonds and electrical disconnects. Newhaven cannot be held responsible for devices used beyond this pull force.

18. Display screen-savers should always be used to minimize display burn-in. Recommended options include screen blanking, scrolling, random patterning, or otherwise to minimize burn-in. This can be accomplished through the controller SW or HW.
19. Products are intended to be used within their normal operating range. Always take into consideration internal product-level temperatures as these may differ from ambient.
20. Flexes may be coated with an ESD protective black paint. Never pick or attempt to remove this coating.
21. Be careful with switching power supplies feeding the display module (both buck and boost).
 - a. Transients voltages during start-up may exceed device ratings.
 - b. Consider the usage of a slightly higher voltage Zener diode to clamp safely.
22. Do not allow the control line voltages (serial or parallel) to exceed V_{CC} . It is common for display controller and driver IC's to include ESD clamping Zener diodes. Should the control line voltages exceed V_{CC} (supply voltages) these diodes may conduct forward current enabling portions of the IC to become active (this would be bad).

SPECIAL GUIDANCE FOR RTP/CTP TOUCH PANELS

1. Displays have cosmetic standards detailing acceptable performance levels. Touch panels (both RTP and CTP) also have cosmetic standards of acceptability. When used in combination, the acceptability standards of each are additive to the end solution.
2. Most CTP's are adhered to the displays around the edge perimeters. Never attempt to separate these assemblies.
3. Optically bonded touch panels utilize full screen adherence to the display. Never attempt to separate these assemblies.
4. The appearance of small air bubbles around the edges or corners of optically bonded panels indicates uneven forces being applied to the product. These forces are attempting to separate the panel from the display and result in bubbles formations in the glass.
5. Avoid un-pressurized air travel of TFT's adhered to CTP panels. Extreme air pressure changes may also cause bubbles to appear within the glue agents.
6. Never apply chemicals to RTP/CTP surfaces. This will result in long term degradation of the panels. Cleaning should only be done with dry lint-free cloth materials.
7. Only use the stylus intended for the touch panel. Super-sharp stylus tips can damage the finish. Consider providing the proper stylus to the end user to avoid product damage.
8. Bezels should be designed to avoid interference with the touch panel surface. When designing consider any expected bezel stamping variations (planar or burrs) to ensure high reliability.
9. Never apply more force to the touch panels than is normally expected. The application of excessive force for the purpose of recognition is indicative of a touch panel failure.
10. When using fingers for actuation, ensure hands are clean of excessive oils or particles. Wet or dirty fingers may not be properly recognized by the touch panels. This is by design.
11. Resistive touch panels are not capable of recognizing multiple-contact points. This is by design.

SPECIAL GUIDANCE FOR MEDICAL DEVICES

1. Medical devices often require sanitization/fumigation after each usage. Displays and Touch Panels should not be exposed to caustic chemicals used during this process. This includes: Chlorine Dioxide, Sodium Hypochlorite (Bleach), Ethyl Alcohol, Alconox, Liquinox, Cidex, Chlorides, or similar. EPA Studies have shown these chemicals cause damage to electronic devices.
2. Sealed housings should be considered for medical devices to avoid any electronics to contacting any of the above agents.

SAFETY-CRITICAL USE CASES

1. Newhaven displays are not intended for safety-critical systems. Newhaven products are targeted for the normal conditions under which light industrial equipment is typically specified.
2. Safety critical systems are those whose failure may result in death or serious injury, loss or severe damage to property, or environmental harm. The product use case should always be considered when selecting and engineering any customer solutions.

WATER SENSITIVITY

1. Exposure to water may corrode PCB's, displays, and touch panels. Sealed product housings may offer protection if exposure to water is likely.
2. Continued exposure to water vapors may also cause product level corrosion leading to malfunctions.
3. Exposure to salt water may expedite device corrosion and should always be avoided.
4. CTP's may not work as expected when the glass surface is wet, this is by design.
5. Product usage in watercraft should carefully concern water/vapor exposure. IP67 rated sealed housing should always be considered.
6. In extreme conditions, users should consider the usage of added conformal coating to best protect PCB's, displays, and touch panels.
7. Corrosion induced damage caused by exposure to water vapor is not covered by the warranty.

DISPLAY CONTRAST ADJUSTMENTS

1. Different devices from different material lots may differ in performance. It is well known in the display industry that this may likely be seen in display color and contrast performance variations. Minor variations are not considered defects if the deviation is within acceptable ranges.

2. Newhaven maintains sets of color charts for each of our sales models. Glass color variations are then compared to the acceptable ranges prior to customer shipments.
3. Variations in contrast should be expected. Notice that many Newhaven specification recommend solutions to overcome this.
 - a. Hardware solutions typically “tune” the V_{OP} voltage between a negative Supply VEE and GND. This tuning is most often done using a potentiometer.
 - b. Customers then adjust the potentiometer for the best display performance prior to use. Parts from the same lot code may exhibit similar performance while parts from a multitude of lot codes may differ. This is the justification for the potentiometer.
 - c. Software solutions are also available on some products. The “Volume Control” command allows for contrast tunability (much like the potentiometer solution) during manufacturing.
4. Newhaven cannot be held responsible for minor lot-to-lot deviations in the V_{OP} contrast performance when tuneability is specifically provided or recommended. This is specifically not covered by the Newhaven warranty.