

3M™ Multi-Touch C4667PW Chassis Display User Guide

Read and understand all safety information
contained in this document before using this product.



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Introduction

Overview

Congratulations on the purchase of your 3M™ Touch Systems Multi-Touch Chassis Display. This guide describes how to set up your 3M™ Multi-Touch Chassis Display.



The 3M Touch Systems product line of chassis displays deliver true multi-touch functionality in a versatile form factor. Perfect for interactive digital signage, interactive tables and kiosk solutions, the 3M Multi-Touch Chassis provides system architects with a high performance, easy to integrate professional display to enable innovative multi-touch solutions.

The combination of 3M's Projected Capacitive Technology (3M PCT) delivering fast, accurate and precise multi-touch response, with a top-of-the-line full high definition LED display, creates an immersive user experience for your next generation interactive applications.

The design of the projected capacitive sensor has thousands of sensing points in close proximity, making it precise and extremely accurate across the entire touch screen. The 3M PCT's durable chemically strengthened glass surface has unique anti-stiction properties that greatly reduces surface friction and allows users' fingers to glide effortlessly across the display for easy gesture functions.

Important Safety Information

Read and understand all safety information before using this product. Follow all instructions marked on the product and described in this document. Pay close attention to the following installation warnings and safety precautions.

Intended Use

The 3M Touch Systems C4667PW Multi-Touch Chassis Display was designed for touch input and tested to replace an existing display. These displays are intended for indoor use only and are not designed for use in hazardous locations.

Explanation of Signal Word Consequences

⚠ DANGER: Indicates a potentially hazardous situation, which, if not avoided, will result in death or serious injury and/or property damage.

⚠ WARNING: Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury and/or property damage.

⚠ CAUTION: Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury and/or property damage.

NOTICE: Indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

⚠ DANGER

To avoid the risk of fire and/or explosion which will result in serious injury or death:

- Do not install or use this product in a hazardous location.

⚠ WARNING

To avoid the risk of electric shock which could result in serious injury or death:

- Do not remove the cover or back of the display. The power supply AC line should be avoided.
- Plug power cord into appropriate grounded power source.
- Do not use a power cord that is frayed or otherwise damaged.
- Do not service the display yourself. There are no user serviceable parts inside. Refer all servicing to qualified service personnel. Any change or modification to the equipment not expressly approved by the party responsible for compliance could void your authority to operate such equipment.

⚠ WARNING**To avoid the risk of electric shock which could result in serious injury or death:**

- Do not use a damaged display.
- Do not use non-conforming replacement parts.
- Do not place liquids, wet or damp objects on the display.
- Do not install or use this product in an outdoor environment
- Be sure to gasket the display to its enclosure properly. Refer to the *3M Multi-Touch PCT2000PX System Integration Guide (TSD-39954)* for more information.
- Do not expose the display to rain or other sources of water, steam, or moisture.
- Do not place foreign objects on the display or its cables.
- Do not remove the cover or back of the display.
- Ensure that connecting the unit to the power source will not overload the power source.
- Do not connect or disconnect this product during a thunder storm or lightning.

⚠ CAUTION**To avoid the risk of glass breakage which may result in minor or moderate injury:**

- To avoid risk of injury when handling the display be aware that the sensor edges may be sharp.
- Handle the display with care to avoid breaking the touch sensor. The display contains glass parts. Dropping the display may cause the glass parts to break.
- Ensure mounting screws are tightened fully to prevent instability.
- Do not place foreign objects on the display.
- Do not use a visibly damaged or broken sensor.
- Ensure that mounting the unit will not adversely affect the stability of the end equipment when installing in free standing equipment or using the VESA mount.

To avoid the risk of glass breakage and impact injury, which may result in minor or moderate injury and/or property damage

- Ensure that mounting the unit will not adversely affect the stability of the end equipment when installing in free standing equipment or using the VESA mount
Product weight is 26.6 kg (57lbs.) .
- Use appropriate lift surface to support the display on installation or two people are required for safe installation.
- Other mounting styles or installation methods are not recommended due to the high level of technician skill and training required for successful load bearing mount installations due to variations in mounting surfaces, dependence on ratings of mounting arms and determining appropriateness of ancillary hardware. Should user elect to disregard this recommendation, user must ensure the installation is performed by an experienced, highly trained technician who is trained in proper load bearing mounting procedures, and user is solely responsible for ensuring the mounting equipment used is appropriate for use with the product.

<p>⚠ CAUTION</p> <p>To avoid the risk of muscle strain, which may result in minor or moderate injury:</p> <ul style="list-style-type: none"> • Always use two people when lifting or installing display, as the display weighs over 26 kgs (57 lbs). <p>To avoid the risk of muscle strain , which may result in minor or moderate injury:</p> <ul style="list-style-type: none"> • Do not install the display in an awkward accessibility orientation. • The user should take frequent breaks to prevent from muscle strain injury <p>To avoid the potentially hazardous situations associated with the use of alcohol or other solvents used for cleaning the touch screen which may result in minor or moderate injury or property damage:</p> <ul style="list-style-type: none"> • Follow all instructions and recommendations in the manufacturer's Material Safety Data Sheet and product label. • Be sure to follow solvent manufacturer's precautions and directions for use when using any solvents • It is important to avoid using any caustic chemicals on the touch sensor. <p>To avoid possible environmental contamination which may result in minor or moderate injury:</p> <ul style="list-style-type: none"> • Dispose of the flat panel display according to applicable governmental regulations.
<p>NOTICE</p> <p>To avoid the risk of potential damage to the display electronics:</p> <ul style="list-style-type: none"> • Always use the VESA 400 mm mounting holes when using an arm attachment. Do not drill additional holes in the unit to mount plates other locations • Do not use longer screws as they could potentially damage electronics inside the display. • Be sure to gasket the display to its enclosure properly to prevent damage to the touch sensor. Refer to the <i>3M Multi-Touch PCT2000PX System Integration Guide (TSD-39954)</i> for more information. • Do not place hot or cold beverages or liquids on the screen display surface.

Important Notes

- In extreme temperature and humidity situations, you may observe condensation between the sensor and the display. To minimize this condition, place the unit where it will be used and allow a 24-hour environmental stabilization period prior to powering on the display. Any noticeable condensation is temporary and will have no long term affect on the operation of the display.
- You are cautioned that any change or modification to the equipment not expressly approved by the party responsible for compliance could void your warranty.
- When unplugging the power supply cord, hold the plug, do not pull by the cord.
- Do not connect or disconnect this product during a thunder storm or lightning.

- Remember to take into account that the operating temperature of the installation may be greater than the room ambient, and consideration should be given to installing the unit in an environment compatible with the maximum rated operating temperature. Specifications can be found in the product data sheet on the 3M Touch Systems website at <http://www.3m.com/touch/>.
- The 3M Multi-Touch Chassis Display may not function as expected at altitudes higher than 2000 meters.
- 3M Touch Systems recommends vacuuming the fan filter at least every six months or if a noticeable rise in surface temperature occurs.
- When installing the unit, ensure that it does not restrict the flow of air to any other equipment within the installation required for safe operation.
- An inherent characteristic of the PCT sensor is a fine grid pattern that may be visible under certain lighting conditions.
- Install the display in a well-ventilated area. Always maintain adequate ventilation to protect the display from overheating and to ensure reliable and continued operation.
- Do not expose this display to direct sunlight or heat. Passive heat may cause damage to the housing and other parts.
- Do not install this display in areas where extreme vibrations may be generated. For example, nearby manufacturing equipment may produce strong vibrations. The vibrations may cause the display to exhibit picture discoloration or poor video quality.
- The 3M touch controllers mentioned in this document are USB compatible full speed devices.
- 3M does not warrant that we are USB compliant pursuant to USB specifications.

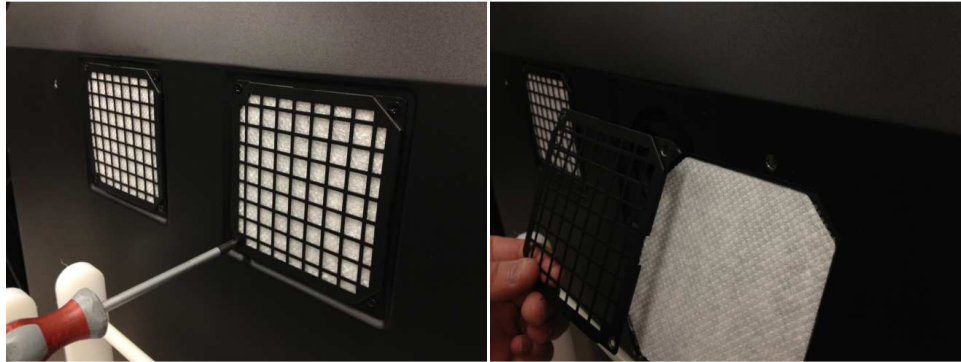
Service and Repair Indicators

Do not attempt to service this unit yourself. Refer to an authorized service personnel in the event that:

- The product does not operate properly when the operating instructions are followed.
- The product exhibits a distinct change in performance, indicating a need for service.

Filter replacement

- Remove screws from the filter cover
- Remove filter cover and filter
- Replace filter
- Re-install cover



Touch Sensor Care and Cleaning

The touch sensor requires very little maintenance. 3M Touch Systems recommends that you periodically clean the glass touch sensor surface. Be sure to turn off your display before cleaning.

Typically, an isopropyl alcohol and water solution ratio of 50:50 is the best cleaning agent for your touch sensor.

CAUTION

To avoid the potentially hazardous situations associated with the use of alcohol or other solvents used for cleaning display screen which may result in minor or moderate injury or property damage:

- Follow all instructions and recommendations in the manufacturer's Material Safety Data Sheet and product label.
- Be sure to follow solvent manufacturer's precautions and directions for use when using any solvents
- It is important to avoid using any caustic chemicals on the touch sensor.
 - Apply the cleaner with a soft, lint-free cloth. Avoid using gritty cloths.
 - Always dampen the cloth and then clean the sensor. Be sure to spray the cleaning liquid onto the cloth, not the sensor, so that drips do not seep inside the display or stain the bezel.

3M Touch Systems Support Services

3M Touch Systems, Inc. provides extensive support services through our website and technical support organization. Visit the 3M Touch Systems website at <http://www.3m.com/touch/>, where you can download MT 7 software and drivers, obtain regularly updated technical documentation on 3M Touch Systems products, and learn more about our company.

Whenever you contact Technical Support, please provide the following information:

- Touch display size, part number and serial number
- Current driver version
- Operating system used
- Information on additional peripherals

Technical Support is available Monday through Friday 8:30 a.m. to 5:30 p.m. with limited call back service after 5:30 p.m. until 8:00 p.m. US Eastern Standard Time – 9 a.m. to 5 p.m. throughout Europe.

You can contact 3M Touch Systems, Inc. Technical Support (US only -- Eastern Standard Time) by calling the hot line, sending email or a fax.

- Technical Support Hot Line: 978-659-9200
- Technical Support Fax: 978-659-9400
- Toll Free: 1-866-407-6666 (Option 3)
- Email: US-TS-techsupport@mmm.com

Contact 3M Touch Systems

Contact information for all offices can be found on our website at: <http://www.3m.com/touch/>

CHAPTER 1

Setting Up Your Multi-Touch Chassis Display

This chapter describes how to set up your 3M Touch Systems Multi-Touch Chassis Display. You need to complete the following tasks:

- Unpack the components
- Connect the video cable, touch display cables, and power cable
- Power on the display and test your setup
- If you are not running Windows® 7 (or Tablet PC), install MT7 software from the enclosed CD.

System Requirements

The C4667PW Multi-Touch Chassis Display requires a personal computer (PC). The requirements for your PC are as follows:

- Your PC must have an available USB port. You connect the touch sensor cable to this communications port.
- Your PC must have a video card and video driver already installed for the display. If you need to install a video card or a video driver, refer to your computer documentation for instructions.

Note: Before setting up your Multi-Touch Chassis Display, refer to the “Important Safety Information” section at the beginning of this document.

Unpacking Your Touch Display

Carefully unpack the carton and inspect the contents. Your C4667PW Multi-Touch Chassis Display includes the following cables and accessories:

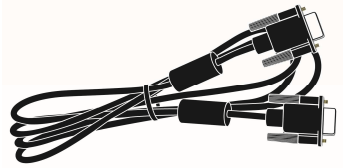
- USB and RS-232 communication cables
- DVI, HDMI, Display Port, and VGA video cables
- US, UK or EU power cables (as needed)
- Hardware Kit -- 4 mounting brackets and (12) 8-32 screws
- Audio Cable

Cables Included with Your Multi-Touch Chassis Display



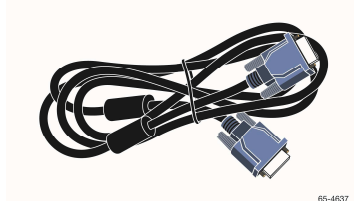
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USB Cable



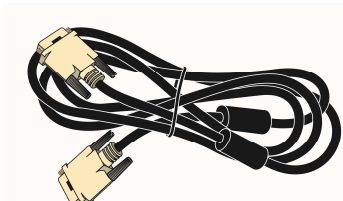
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9-pin RS-232 serial cable



65-4637

VGA Cable



65-4639

DVI Cable



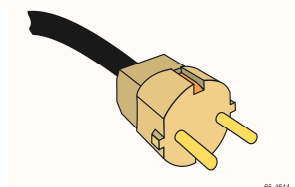
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US Power Cable



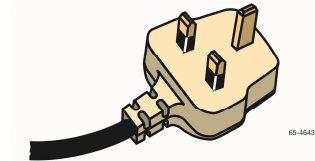
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HDMI Cable



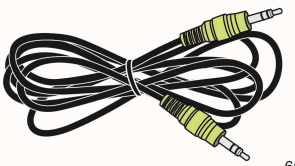
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EU power cable (optional)



65-4643

UK power cable (optional)



65-4641

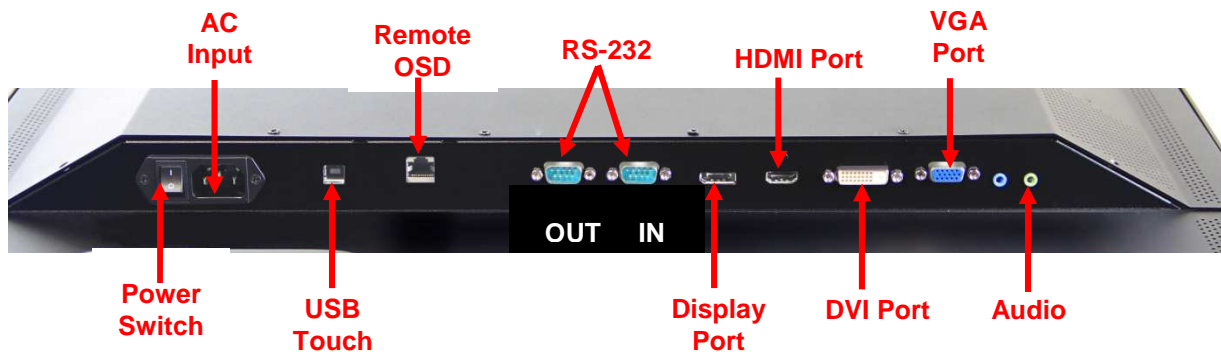
Audio Cable

Connecting the Touch Display

Note: You are cautioned that any change or modification to the equipment not expressly approved by the party responsible for compliance could void your warranty.

To connect the Multi-Touch Chassis Display:

1. Turn off your computer. You should always turn off the computer before connecting or disconnecting a device.



2. Select the appropriate video cable: Display Port, HDMI, DVI, or VGA. Connect one end of the video cable to the video connector on the display. Connect the other end to the video card in your computer.
3. Connect one end of the USB touch sensor cable to the LCD. Connect the other end to an available port on your computer.
4. Connect the power cable to an appropriate grounded power source.

Multimedia Features

The C4667PW Multi-Touch Chassis Display comes with speakers built into the back of the display housing and includes audio cables. These cables can be connected underneath the display.

Testing the C4667PW Multi-Touch Chassis Display

Note: The C4667PW Multi-Touch Chassis Display has a power status light and video controls located on the side of the display.

Before testing your touch display, make sure all cables are connected properly. Be sure to tighten all cable screws. After connection, turn on the power switch located on the back of the display.

To test that the display is working properly:

1. Turn on your computer.

2. Make sure the video image is displayed. If it is not, check the LED to ensure that the display is not in power save mode (amber)
3. Make sure the video image is centered within the screen area. Use the display controls to adjust the image, if necessary.

You can adjust the horizontal and vertical position, contrast, and brightness to better suit your video card and your personal preference. For additional details, refer to the Adjusting the Video Display later in this chapter.

Mounting the Multi-Touch Chassis Display

The C4667PW Multi-Touch Chassis Display is designed to fit any type of enclosure. All 3M Touch Systems chassis displays are encased in rugged metal instead of plastic, making them easy to integrate.

CAUTION

To avoid the risk of glass breakage which may result in minor or moderate injury:

- To avoid risk of injury when handling the display be aware that the sensor edges may be sharp.

CAUTION

To avoid the risk of glass breakage and impact injury, which may result in minor or moderate injury and/or property damage

- Read, follow and understand the mounting instructions and hardware provided. Product weight is 26.6 kg (57lbs.)
- Use appropriate lift surface to support the display on installation or two people are required for safe installation.
- Other mounting styles or installation methods are not recommended due to the high level of technician skill and training required for successful load bearing mounts and due to variations in mounting surfaces, dependence on ratings of mounting arms and appropriateness of ancillary hardware. Should user elect to disregard this recommendation, user must ensure the installation is performed by an experienced technician who is trained in proper load bearing mounting procedures, and user is solely responsible for ensuring the mounting equipment used is appropriate for use with the product.

The C4667PW Multi-Touch Chassis Display includes a hardware accessory kit for mounting the unit into an enclosure. The hardware accessory kit includes 4 mounting brackets and (12) 8-32 screws. The mounting holes are located on all 4 sides of the display. Always use the supplied screws.

Note: Always use the mounting holes when attaching to the brackets. Do not drill additional holes in the unit to mount brackets to other locations.

Note: Given the variety of factors that can affect the use and performance of any product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the specific gasket to determine whether it is suitable for a particular purpose and suitable for the user's intended application

NOTICE**To avoid the risk of potential damage to the display electronics:**

- Always use the VESA 400 mm mounting holes when using an arm attachment. Do not drill additional holes in the unit to mount plates other locations
- Do not use longer screws as they could potentially damage electronics inside the display.

Access to the Video Controls

The C4667PW Multi-Touch Chassis Display has seven buttons for using the on-screen menu and adjusting the video display. These controls are located on the side of the Multi-Touch Chassis Display. These buttons let you display the on-screen menu and adjust the phase, image position, contrast, and brightness. Make sure you will be able to access the video controls once the C4667PW Multi-Touch Chassis Display is installed.

If enclosure space is tight and access is important, an on screen display remote control (part number 30114) is an option.



Clearance and Ventilation

Leave at least two inches of clearance space behind the C4667PW Multi-Touch Chassis Display for proper ventilation. Units have vent holes at the top and bottom on the back of the chassis -- ensure these holes are not blocked during installation. Always maintain adequate ventilation to protect the display from overheating and to ensure reliable and continued operation.

Note: Be sure to leave at least 2 inches clearance around fan inputs.

Refer to the published specifications for the maximum and minimum operating temperature and humidity conditions. Refer to the product data sheet on the 3M Touch Systems website at <http://www.3m.com/touch/>.

Video Card Requirements

Before you connect your touch display, make sure our computer has a video card installed that supports the native video resolution of 1920 x 1080 for the Multi-Touch Chassis Display. If you need information on installing a video card or video driver, refer to the manual that came with your video card.

Using the Standard Controls for the Video Card

In addition to the standard controls on the display, each video card has several controls that let you adjust the display settings. The software and driver for each video card is unique. In most cases, you adjust these settings by using a program or utility provided by the manufacturer of the video card.

For example, you can use the Windows Display Properties control panel to adjust the desktop area (resolution), color depth, and refresh rate. Whenever you change these settings, the image size, position, or shape may change. This behavior is normal. You can readjust the image using the display controls described in this chapter.

For more information on adjusting the desktop area/resolution, color depth, or refresh rate, refer to the user manual that came with your video card. If you change the resolution, it is a good idea to calibrate your sensor.

Supported Video Display Modes and Refresh Rates

Your video card should support one of the display modes specified below. If you select an unsupported video mode, the display may stop working or display unsatisfactory picture quality.

Display Mode	Refresh Rate (Hz)
640 x 480	60
800 x 600	60
1024 x 768	60
1152 x 864	70
1280 x 720	60
1280 x 768	60
1280 x 960	60
1280 x 1024	60
1360 x 768	60
1366 x 768	60
1600 x 1200	60
1680 x 1050	60
1920 x 1080	60

Configuring the Display Settings

After you connect your C4667PW Multi-Touch Chassis Display and turn on your computer, you may need to configure one or more of these display settings. The ideal setting for the C4667PW Multi-Touch Chassis Display is as follows:

- Display mode (also called desktop area or video native resolution) 1920 x 1080
- Refresh rate (also called vertical scan rate or vertical sync) 60 Hz
- Color depth (also called color palette or number of colors) at least 16-bit (high color)

Adjusting the Multi-Touch Chassis Video Display

This section provides guidelines for adjusting the video display and using the display controls to adjust the image to your liking. The controls for adjusting the video display are located on the back of the Multi-Touch Chassis Display. These buttons let you display the on-screen menu and adjust the phase, image position, contrast, and brightness. Before you make any adjustments:

- Be sure to adjust the controls in your normal lighting conditions.
- Display a test image or pattern whenever you adjust the video.

On Screen Display

Your C4667PW Multi-Touch Chassis Display has seven controls for adjusting the video display.



POWER SOURCE UP DOWN + - MENU

Power -- Turns the display on and off.

Source -- Selects the applicable input source: VGA, HDMI, Display port, or DVI. Settings are saved automatically.

Up -- Press to move among the menus and from the menu selection to specific choices.

Down -- Press to move among the menus and from the menu selection to specific choices.

+ (plus sign) -- Increases and decreases the volume.

- (minus sign) -- Press to decrease the volume.

Menu -- Shows or hides the onscreen display menu and acts as the Select key when scrolling through menu options. Refer to Menu Navigation below for additional information.

If you do not press any buttons, the display adjustment program times out (you can adjust this time -- up to 30 seconds) and hides the menu options. You can press the Menu button at any time to display the options again.

Pressing Menu will pull up the On Screen Display (OSD) menus to control the Picture, Color, Display, OSD Settings, and Setup, as shown below.

Menu Navigation

To adjust the On-Screen Display:

1. Select the Menu button to bring up the on-screen display (OSD)
2. Use the Up and Down buttons to scroll through the various Menu choices:
 - Picture Menu
 - Color Menu
 - Screen/Display Menu
 - OSD Menu
 - Setup Menu
3. Once the Menu you want is highlighted, hit the Menu button again to select that Menu.
4. Use the Up and Down buttons to scroll through the various Menu options. For example, once you have chosen the Picture Menu, use the Up/Down buttons to select either Brightness, Contrast, or Sharpness.
5. Once the option you want is highlighted, hit the Menu button again to select that option.
6. Use the Up and Down buttons to increase or decrease the value of the option.
7. Your selection will be automatically saved.

Image Menu

Includes choices for Brightness, Contrast, and Sharpness.



Brightness

Selecting the Brightness option will allow you to adjust the luminescence of the display. Settings are saved automatically.



Contrast

Selecting the Contrast option increases or decreases the strength (lightness or dimness) of the image. Settings are saved automatically.



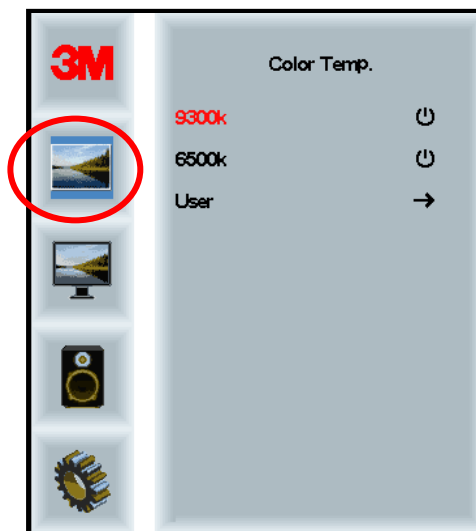
Sharpness

Adjusts the video quality to be sharp or blurry (special for text mode). Settings are saved automatically.



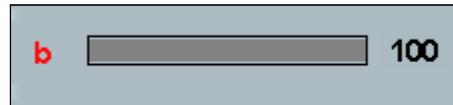
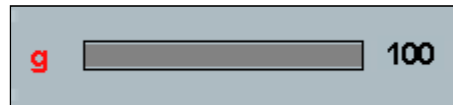
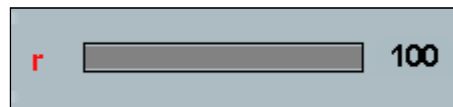
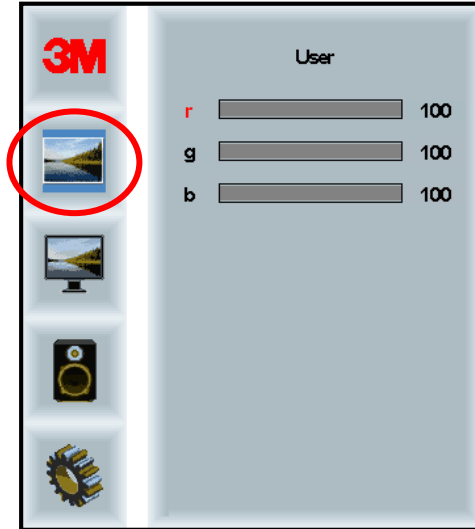
Color Settings

Includes choices for 9300k, 6500k, and User Defined Color.



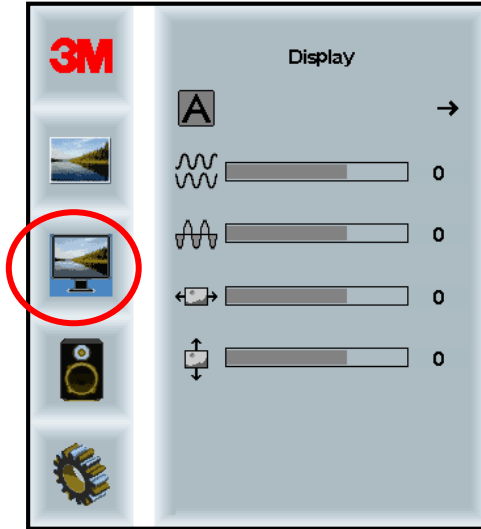
User Defined Settings

Adjust the Red, Green and Blue channels to your preference. Settings are saved automatically.



Display Menu

Includes choices for Auto Configure, Horizontal Position, Vertical Position, Clock and Phase.



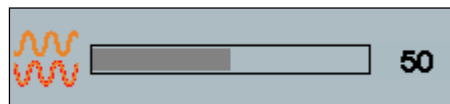
Auto Configure

Performs automatic configuration of the Clock, Phase, Vertical and Horizontal positions. If you do an Auto Configure, the display will try to find the best setting. If you are not satisfied with the auto adjustment, fine-tune the settings manually as described below. Settings are saved automatically.



Phase

Adjust this setting so that either the vertical bars of video noise are replaced by an even amount of noise across the whole screen, or the noise disappears completely. Settings are saved automatically.



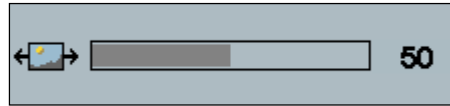
Clock

If the clock setting is not fine-tuned, you may observe periodic vertical bars of video noise on your image. These bars of noise are usually adjusted out when an Auto Adjust is performed. If the bars of noise are still present, this setting can be adjusted manually. Settings are saved automatically.



H Position (Horizontal Position)

Moves image horizontally on screen either left or right. Settings are saved automatically.



V Position (Vertical Position)

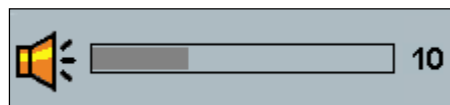
Moves images vertically on screen either up or down. Settings are saved automatically.



Audio Menu

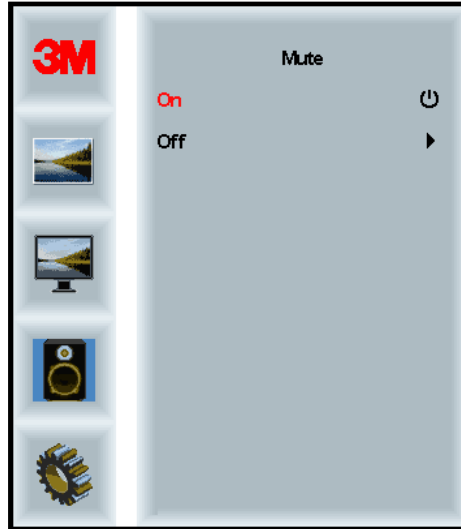


Volume

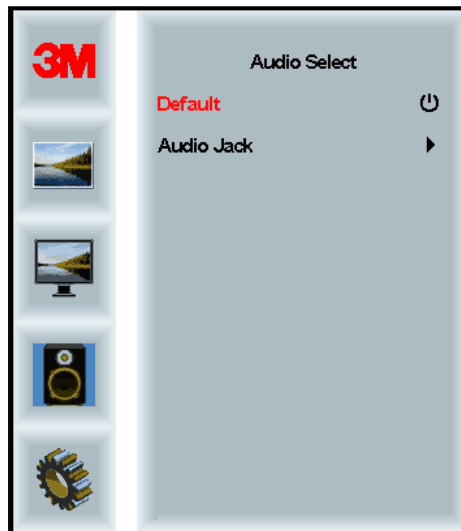
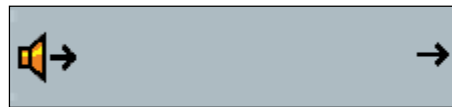


Mute





Audio Select



Digital video signal inputs, HDMI and Display Port, provide audio inputs. They will be a priority unless external audio input is selected.

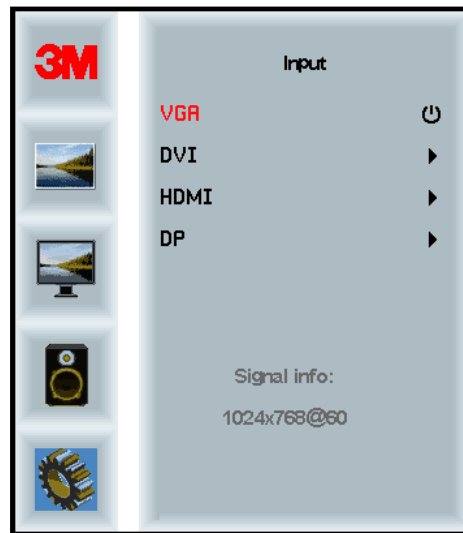
System Menu

Includes choices for Input Source, Menu Settings, Languages, Aspect Ratio, Dynamic Contrast Ratio, Factory Reset, and Monitor ID.



Source

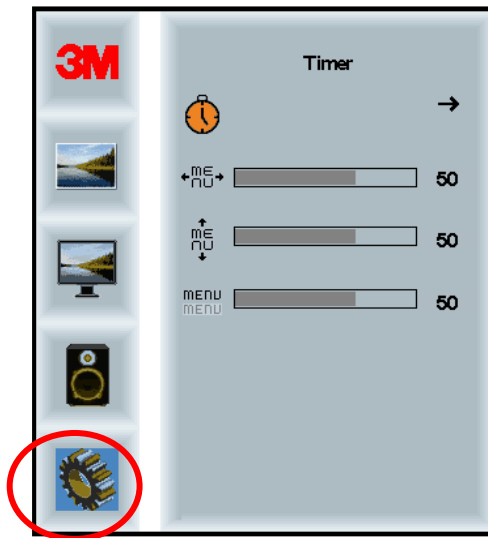
Source sets the input mode for the display either VGA, DVI, HDMI, or DP.



Menu Settings

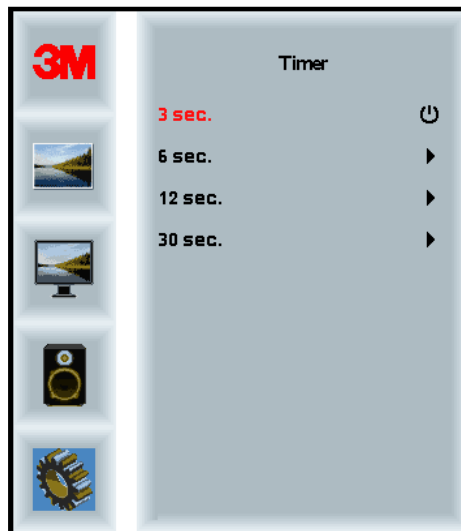
Includes choices for OSD Timer, OSD Horizontal position, OSD Vertical Position, and OSD Transparency.





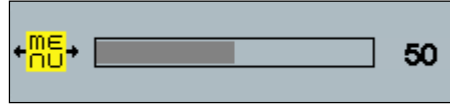
OSD Timer

Adjust how long the menu remains on the screen. Settings are saved automatically.



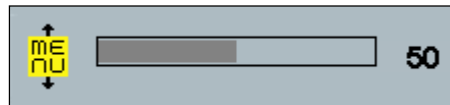
OSD H Position

Adjusts the horizontal placement of the OSD display on your screen. Settings are saved automatically.



OSD V Position

Adjusts the vertical placement of the OSD display on your screen. Settings are saved automatically.



Transparency

Adjusts the transparency of the OSD screen on your display. Settings are saved automatically.



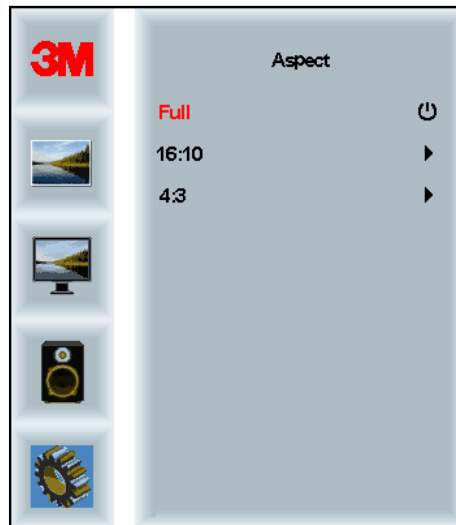
Language

Sets the language for the OSD -- the choices are English, French, German, Italian, Spanish, Japanese and Chinese. Settings are saved automatically.



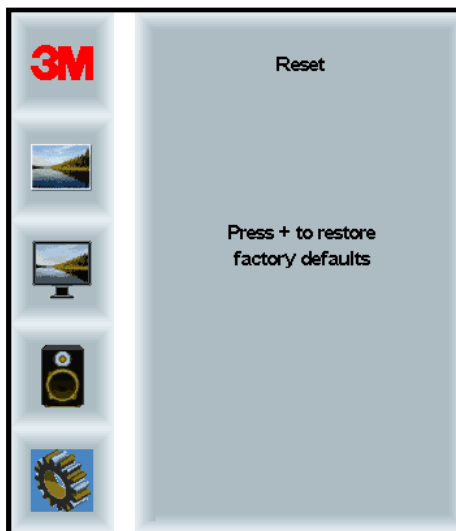
Aspect Ratio

Set the preferred aspect ratio for your display -- either Full, 16:10, or 4:3



Factory Reset

Resets the control functions back to the original factory preset values. Settings are saved automatically.



CHAPTER 2

Enabling Your Multi-Touch Chassis Display

Windows® 7 USB Compatibility

3M Multi-Touch technology works seamlessly with the Windows® 7 operating system. The Multi-Touch display supports USB HID for direct communication. The C4667PW Multi-Touch Chassis Display leverages all the multi-touch functionality that is native to Windows® 7. Plug the display into a system running Windows® 7 and you'll quickly enter the world of true multi-touch functionality.

The C4667PW Multi-Touch Chassis Display is compatible with Windows® 7 with no additional software. Refer to Microsoft's Windows® 7 documentation for additional information.

All Other Platforms

When using a Windows® 7 serial connection or for Windows® XP, Vista or Linux operating systems (either USB or serial), 3M provides MicroTouch™ MT 7 Software for multi-touch drivers. This guide includes information for writing your own drivers to interface with the 3M Multi-Touch Technology.

Multi-Touch Application Support

Remember not all applications are multi-touch ready – Multi-touch behavior is a function of YOUR application. Check with your application vendor to determine if your software has multi-touch capability.

Installing 3M™ MicroTouch™ Software

Remember that Windows® 7 does not require any additional software to enable multi-touch functionality.

However, for Windows® XP, Vista or Linux® operating systems, 3M™ MicroTouch™ Software enables your C4667PW Multi-Touch Chassis Display to work with your computer. 3M™ MicroTouch™ Software includes a control panel for setting your touch sensor preferences and a diagnostic utility. If you are experiencing problems with the touch sensor, you can use the diagnostic utilities provided to test the system.

For more information on installing this software and using the control panel, refer to the 3M™ MicroTouch™ Software User Guide on the accompanying CD or on the corporate website at www.3m.com/touch.

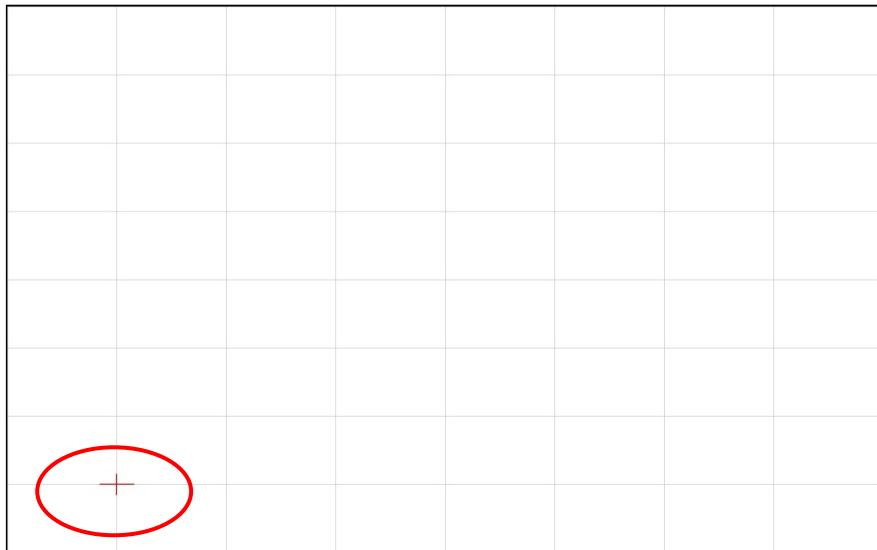
Video Alignment

The Multi-Touch Chassis has been calibrated prior to shipment and the display as delivered does not require video alignment. You should be able to accurately touch icons on the sensor. If for some reason, you cannot do this, the touch sensor's active area may not be aligned to the underlying video.

Regardless of the operating system, after you connect your touch display:

- If you are using Windows® 7, you may calibrate by accessing the Software Diagnostic Utility (SDU) found on the enclosed CD.

Launch the SDU from the CD. Select the Tools menu and highlight Calibration. The screen below appears and you should touch the 2 targets as they appear. Press Escape to cancel Calibration.



- If you are using 3M™ MicroTouch™ MT 7 Software, launch the MT 7 Control Panel and follow the instructions on the Main tab. You'll be asked to touch 3 targets.



- If you are writing your own drivers, you should provide your own video alignment tool.

Use the Paint program (Start→ Programs→ Accessories→ Paint) to determine if you have multi-touch operation. Retest the accuracy after you perform a calibration.

APPENDIX A

3M™ PX USB Controller Communications

This appendix is intended for software developers only and discusses the fundamentals of communicating with the 3M™ PX controller. The firmware commands, which are usually issued by a driver or utility program on the host system, control the operation of the controller. This appendix lists the recommended firmware commands and describes how to use each of these commands.

Overview of USB Firmware Communications

Developers may use this information when writing touch applications, developing custom drivers or touch configurations, or testing their touch systems. Developers can issue commands to initialize the controller, select operating modes, and execute diagnostic functions.

Note: This document assumes you are familiar with USB standards and modes of communication with USB devices, as well as firmware commands and how to use them. Executing some commands may alter the performance of your sensor and render it inoperable. You should be aware of the results before executing any firmware commands.

To optimize the performance of the PX controller and simplify the development of custom drivers, 3M Touch Systems recommends you use the commands listed in this appendix for current development.

Communication Basics

This section provides information on sending firmware commands to the controller and interpreting the responses that the controller returns. The default operation of the PX controller is USB Rev 2.0 full speed.

The USB command set is implemented by using vendor requests and vendor reports, i.e., vendor specific transactions. The controller issues some reports without prompting the computer. The computer can also send requests to the controller to change how it operates or receives information about the controller. The controller issues a synchronous report in response to some of these requests.

You need to know product ID (0530H) and the vendor ID (0596H) to write your own driver. These values are required for identifying the controller.

Receiving Reports from the Controller

The controller sends a variety of reports to the computer. The first byte of each report is the Report ID that defines the structure and content of the report. The controller sends some reports as a direct response to a computer request (synchronous). The controller will also send some reports as the result of an external event, such as a touch (asynchronous).

Command Set

The USB command set is implemented by using HID Get Feature and Set Feature commands. The various requests and reports are grouped together by report size under a common feature ID.

The following table summarizes the available HID class requests.

Table 1. HID Class Requests Summary

HID Report	Command Name	bmRequest Type	bRequest	Feature Report ID	Report Subtype	Data Stage Bytes
Get Feature	GetStatus	0xA1 (D2H)	0x01	0x06	--	8
Set Feature	Calibrate	0x21 (H2D)	0x09	0x03	4	8
Set Feature	Reset	0x21 (H2D)	0x09	0x03	7	8
Set Feature	Restore Defaults	0x21 (H2D)	0x09	0x03	8	8
Get Feature	GetMaxCount	0xA1 (D2H)	0x01	0x12	--	2

Set Feature - Calibration

This is a command to do a Calibrate Extended style calibration. The controller will auto-orient on this 2 point calibration.

Table 2. Calibration Setup Stage

Offset	Field	Size	Value	Description
0	bmRequestType	1	0x21	Class,H2D,Interface
1	bRequest	1	0x09	Set Report
2	wValue	2	0x0303	Msb 03 = Feature Lsb 03 = Feature Report ID
4	wIndex	2	0	Always 0
6	wLength	2	8	Always 8

Table 3. Data Stage

Offset	Field	Size	Value	Description
0	Report ID	1	0x03	Feature report ID
1	Report Subtype	1	0x04	Indicates a calibration request
2	bCalType	1	0x01	0x01 = Extended cal (CX)
3--7	Not used	5	0	Not used

The device stalls endpoint 0 if the command cannot be processed successfully. The request cannot be processed if an invalid calibration type is given in the wValue field. The request will also fail if the 2 calibration points do not fall within certain bounds established by the firmware. These bounds require that the 2 calibration points be in opposite quadrants of the sensor.

The host should issue a GetStatus request to determine the status of this request. The status report includes a command status byte which will be set as shown below.

Table 4. Calibration Response

Command Status Byte	Description
0	Calibration Failed
1	Controller is waiting for a touch in the lower left corner. Calibration software paints a target in the lower left corner.
2	Controller is waiting for a touch in the upper right corner. Calibration software paints a target in the upper right corner.
3	Calibration completed successfully.

The controller does not timeout waiting for touch. Use the Soft Reset command to abort the calibration.

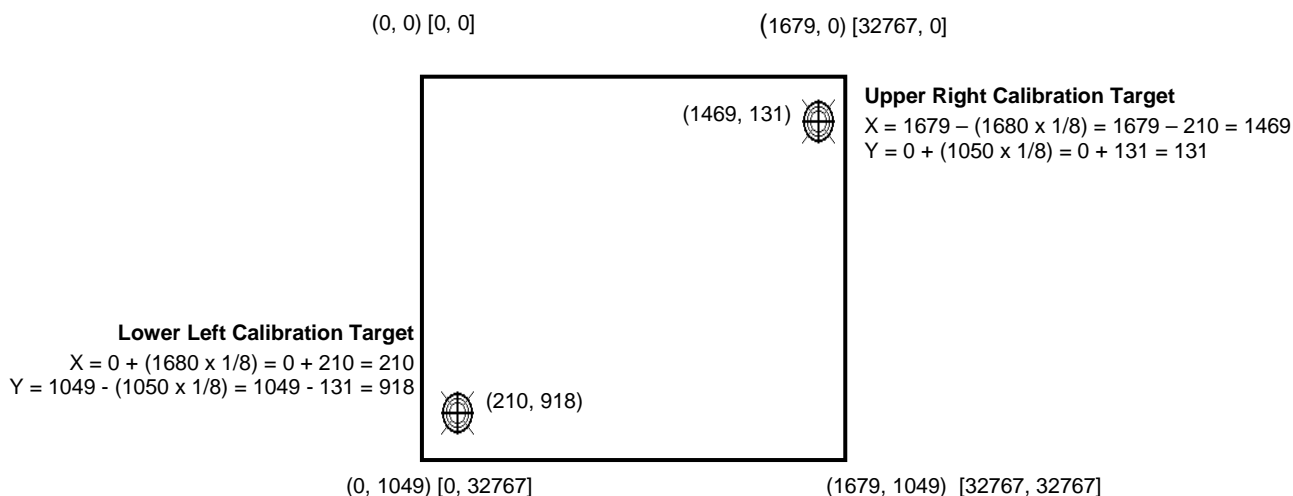
Determining Target Areas

The default calibration targets (points) are located 12.5% (1/8) inward from the corners of the video image. For example, suppose the resolution of your Windows-based display is 1680 x 1050. The Calibrate Extended command calculates the amount to move inward as follows:

- Amount to move inward in the X direction: $1680 \times 1/8 = 210$
- Amount to move inward in the Y direction: $1050 \times 1/8 = 131$

The Calibrate Extended command then positions the first calibration target inward from the lower left corner (0,1049) and the second calibration target inward from the upper right corner (1679,0). The following illustration shows how the calibration targets are calculated for a Windows-based system. Your operating system may be different.

The illustration below shows the coordinates of the calibration targets and display corners. The corners show the video coordinates in parentheses and the touch screen coordinates in brackets.



Note: Other screen resolutions will scale proportionally. The touch coordinates will not change.

Get Feature - GetStatus

This is a request to send information that indicates the status of the controller. Among the uses for this request are determining whether there were any power on check errors and determining whether the last request was completed successfully.

Table 5. Controller Status Setup Stage

Offset	Field	Size	Value	Description
0	bmRequestType	1	0xA1	Class,D2H,Interface
1	bRequest	1	0x01	Get Report
2	wValue	2	0x0306	msb=03=Feature lsb=06= Feature Report ID
4	wIndex	2	0	Always 0
6	wLength	2	8	Always 8

Table 6. Controller Status Data Stage (controller response)

Offset	Field	Size	Value	Description
0	Report ID	1	0x06	Feature Report ID
1	POC Status	1	0xXX	Power On Check Status
2	Cmd Status	1	0xXX	Status of last command
3	Touch Status	1	0	Not used
4	Async Reports	1	0xXX	0x00 = async touch output off 0x01 = async touch output on
5-7	Not used	3	0	Not used

POC Status – The status of the Power-on Checks. Various controller systems are checked at power-up. If any failures in these systems are detected, a POC flag is set. The POC status field reports the state of these flags.

Table 7. Power On Check Bit Fields

Bit Number	Description	Notes
0	Not used	
1	ROM_ERROR	Code area checksum error
2	PWM Error	Touch screen not connected or potential problem
3	NOV_ERROR	Parameter blocks checksum error
4	HDW_ERROR	Problem with ADCs
5--7	Not used	

Command Status – The status for the last command request. This field is used to determine whether the last request was processed successfully. It is also used to track the progress of a multi-stage request, such as 2 point calibration. The Status Request does not affect the contents of this field, i.e., successful or unsuccessful processing of a previous status request does not cause the command status field to be updated.

Table 8. Valid Command Status Field Entries

Response	Description
0	Failure in command processing
1	Command being processed
2	Stage 1 processing complete (for multi-stage commands)
3	Command complete
4	Soft Reset Occurred
5	Hard Reset Occurred
6 -- 7	Not used

Get Feature - GetMaxCount

This is a request to send information that indicates the maximum number of simultaneous touches supported by the controller.

Table 9. Setup Stage

Offset	Field	Size	Value	Description
0	bmRequestType	1	0xA1	Class,D2H,Interface
1	bRequest	1	0x01	Get Report
2	wValue	2	0x0312	msb=03=Feature lsb=12 Feature Report ID
4	wIndex	2	0	Always 0
6	wLength	2	2	Always 2

Table 10. Data Stage (controller response)

Offset	Field	Size	Value	Description
0	Report ID	1	0x12	Feature Report ID
1	Max Count	1	0x1E	Number of actual fingers supported

Note: The number of actual contacts reported may exceed this number.

Set Feature - Reset

This is a request to perform a controller reset. Soft resets are automatic after any block parameter changes.

Table 11. Reset - Setup Stage

Offset	Field	Size	Value	Description
0	bmRequestType	1	0x21	Class,H2D,Interface
1	bRequest	1	0x09	Set Report
2	wValue	2	0x0303	msb=03=Feature lsb=03= Feature Report ID
4	wIndex	2	0	Always 0
6	wLength	2	8	Always 8

Table 12. Reset – Data Stage

Offset	Field	Size	Value	Description
0	Report ID	1	0x03	Feature Report ID
1	Report Subtype	1	0x07	Indicates a reset request
2	bResetType	1	0x01 0x02	Soft Reset Hard Reset
3--7		5	0	Not used

A Hard Reset will cause the controller to re-enumerate.

In the case of a Soft Reset, after sending the command, the controller will acknowledge (ACK) the transfer, but the command will not yet be completed. Before sending any other commands, the host should poll with GetStatus until the command status field returns “Soft Reset Occurred,” “Command Complete,” or “Fail”. Any timeout for this status polling should be 2 seconds minimum.

Set Feature –Restore Defaults

This is a request to restore parameter defaults.

Table 13. Restore Defaults -- Setup Stage

Offset	Field	Size	Value	Description
0	bmRequestType	1	0x21	Class,H2D,Interface
1	bRequest	1	0x09	Set Report
2	wValue	2	0x0303	msb=03=Feature lsb=03= Feature Report ID
4	wIndex	2	0	Always 0
6	wLength	2	8	Always 8

Table 14. Restore Defaults - Data Stage

Offset	Field	Size	Value	Description
0	Report ID	1	0x03	Feature Report ID
1	Report Subtype	1	0x08	Restore Defaults
2-7		6	0	Not used

After sending this command, the controller will acknowledge (ACK) the transfer, but the command will not yet be completed. Before sending any other commands, the host should poll with GetStatus until the command status field returns “Command Complete” or “Fail”. Any timeout for this status polling should be 2 seconds minimum.

Asynchronous Reports

Coordinate Data – Multi-Touch Digitizer mode Async Report 0x13

This is used to transfer the coordinate data to the host. This report, when activated, is sent to the host whenever new data is available or scheduled for transmission. It is an asynchronous report that is activated by default at power up.

The report shown below supports up to 6 simultaneous touches. Note that if more than 6 touches were to be supported, Report 0x13 would be sent as many times as necessary to accommodate the number of fingers touching. Only the first Report 0x13 will have a non-zero actual count. Each valid touch is marked with an ID number that remains the same from touchdown through liftoff. The ID number can be any value from 0 to 255. Ignore all other data within a touch report structure with a status marked “not valid”.

The coordinate system is Upper Left origin.

Table 15. Coordinate Data Report 0x13 --Data Stage

Offset	Field	Size	Value	Description
0	Report ID	1	0x13	Report ID
1	Touch Report	10	See table 16	Touch Report Structure
11	Touch Report	10	See table 16	Touch Report Structure
21	Touch Report	10	See table 16	Touch Report Structure
31	Touch Report	10	See table 16	Touch Report Structure
41	Touch Report	10	See table 16	Touch Report Structure
51	Touch Report	10	See table 16	Touch Report Structure
61	Actual Count	1	1 to 60	Number of valid touch reports
62	Not used	1	0	
63	Not used	1	0	

Table 16. Touch Report Structure

Offset	Field	Size	Value	Description
0	Status	6	0xXX	0x00 Report not valid 0x04 Not touching 0x07 Touching
1	Touch ID	1	0-255	Touch thread ID number
2	X lsb	1	0xXX	X (0-7FFF)
3	X msb	1	0xXX	
4	Y lsb	1	0xXX	Y (0-7FFF)
5	Y msb	1	0xXX	
6	Width lsb	1	0xXX	Width (0-7FFF)
7	Width msb	1	0xXX	
8	Height lsb	1	0xXX	Height (0-7FFF)
9	Height msb	1	0xXX	

APPENDIX B

Troubleshooting & Maintenance

If you have a problem setting up or using your display, you may be able to solve it yourself. Before calling 3M Touch Systems, try the suggested actions that are appropriate to the problems you are experiencing with the display. You may also want to consult your video card user's manual for additional troubleshooting advice.

Display Installation Problems

Table 21. Common Display Installation Issues

Issue	Solution
No image displayed (blank screen)	<p>Is the display receiving power?</p> <ul style="list-style-type: none"> • Check that the computer's power cable is connected properly and securely into a grounded electrical outlet. • Check that the AC input jack is firmly plugged into the display. • Check that the display's power cable is connected properly and securely to an electrical outlet. • Try using a different power cable. • Try using a different electrical outlet.
No image displayed (blank screen)	<p>Is the display receiving a valid video signal from the PC?</p> <ul style="list-style-type: none"> • Check that the computer is powered on. • Check that the video cable is connected properly and securely to the display and the computer. • Check that the LED on the rear of the unit is green. • Check that no pins are bent in the video cable connector. • Check that the video card is firmly seated in the card slot in your computer.

Issue	Solution
	<ul style="list-style-type: none"> • Check that the video input from the video card falls within the refresh rate of the display. Refer to <i>Supported Video Display Modes and Refresh Rates</i> in Chapter 1. • Check that your computer is using a supported display mode. Refer to <i>Supported Video Display Modes and Refresh Rates</i> in Chapter 1.
No image displayed (blank screen)	<p>Is the display in Power Management mode?</p> <ul style="list-style-type: none"> • If the LED on the rear of the display is flashing amber, touch the screen, press any key on the keyboard, or move the mouse to restore operation. • Verify source selection is correct (OSD)
No image displayed (blank screen)	<p>Are the brightness and contrast settings too low?</p> <ul style="list-style-type: none"> • Use the display controls to adjust these values.
Abnormal image	<ul style="list-style-type: none"> • Check that the video input from the video card falls within the refresh rate of the display. Refer to <i>Supported Video Display Modes and Refresh Rates</i> in Chapter 1. • Check that the video cable is connected properly and securely to the display and the computer.
Colors of image are abnormal	<ul style="list-style-type: none"> • Check that the video cable is connected properly and securely to the display and the computer. • Check that no pins are bent in the video cable connector.
Disturbances on the screen	<ul style="list-style-type: none"> • The video display adjustments are incorrect. Refer to Chapter 2 for adjusting procedures.

Troubleshooting the Touch Sensor

If you are experiencing problems with the touch sensor, check the following list of common installation errors.

Table 22. Common Touch Sensor Installation Issues

Common Installation Issues	Possible Solutions
Touch sensor does not respond to touch	<ul style="list-style-type: none"> • Review the installation procedures. Are all cables connected properly? • After you installed Touch Software, did you restart your PC to activate the touch sensor driver? • Remove the sensor communications cable and plug it back in. • Disconnect the power cable and plug it back in.
Touch sensor is not accurate	<ul style="list-style-type: none"> • Calibrate the touch sensor for the current video resolution and operating system. Refer to the Video Alignment section in Chapter 3 for additional information.

Common Installation Issues	Possible Solutions
Cursor does not follow finger movement or does not reach the edges of the sensor	<ul style="list-style-type: none">• Calibrate the touch sensor for the current video resolution and operating system. Refer to the Video Alignment section in Chapter 3 for additional information.
Cursor is not located directly underneath your finger	<ul style="list-style-type: none">• Open the touch sensor control panel and make sure all cursor offsets (vertical, edge/horizontal) are turned off.• Calibrate the touch sensor for the current video resolution and operating system.

Power Management

The C4667PW Multi-Touch Chassis Display conforms to the Video Electronics Standards Association (VESA) Display Power Management Signaling (DPMS) standard. To benefit from power management, the display must be used in conjunction with a computer and video card that implements the VESA DPMS standard.

The PC automatically invokes the power management feature if you do not use the touch sensor, mouse, or keyboard for a user-defined period. To restore the video image, simply touch the sensor, press a key, or move the mouse. To set the period of time after which the PC will invoke the power management feature, refer to the user manual that came with your video card or PC. The touch sensor will remain on throughout this sequence.

APPENDIX C

Regulatory Information

Regulatory Agency Approvals

Your product complies with the following regulatory standards:

- FCC-B
- CE
- CCC
- UL60950/IEC60950/EN60950 certified in compliance with the CB test scheme

This equipment has been tested and found to comply within limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Move the equipment away from the receiver.
- Consult the dealer or an experienced radio/television technician for additional suggestions.

Note: You are cautioned that any change or modification to the equipment not expressly approved by the party responsible for compliance could void your warranty.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

This device complies with Part 15 of the FCC rules: Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Warning

To assure continued FCC compliance, the user must use the supplied grounded power supply cord and the provided shielded video interface cable with bonded ferrite cores. Also, any unauthorized changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device.

3M Touch Systems is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment.

CE Conformity for Europe

The device complies with the requirements of the EU RoHS Directive 2011/65/EU, the ECC directive 2004/108/EC with regard to "Electromagnetic compatibility" and 2006/95/EC with regard to "Safety".