



Product Specification

Model TM61P~G350

P/N 510-000403-01, Rev A

Revision History

ECO	Rev	Description	Release Date	Originator
14581	1	Release to Prototype	23 Sep 05	John Vanderwouw
15599	A	Release to Production	15Mar 06	D Weatherall PM: J Vanderwouw

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General Description

The Synaptics TouchPad module:

- Has a sensor surface (Figure 1) and the other side contains electronic components (Figure 3). A smooth and durable Facesheet protects the sensor surface area. The Facesheet covering can be screen-printed in any color or pattern upon request.
- Is compatible with the standard Microsoft mouse driver.
- Supports “graphics tablet mode,” which turns the module into a finger-operated, pressure-sensitive graphics tablet. In this mode, host software receives the absolute position (X, Y) and pressure (Z) information.
- Conforms to the Synaptics cosmetic specification within the maximum bezel opening dimensions. Cosmetic imperfections may occur in the top surface of the TouchPad in the area that is outside the maximum bezel opening dimensions.

Device Driver Features

- Minimum driver version: 8.1.11
- Compliant with Microsoft Windows Hardware Quality Labs (WHQL) standards. The vendor of the product containing this TouchPad is required to submit the whole product to Microsoft for WHQL approval, if desired.
- Tap - emulates a mouse “left click”
- Double Tap - emulates a mouse “double click”
- Tap & Drag - emulates a “click and drag” of a mouse
- Includes a special “Edge Motion” feature that allows drag operations to continue past the edge of the pad. When the user’s finger reaches the edge of the pad, the cursor continues to coast in the desired direction.
- Avoid unwanted cursor movement during typing with the PalmCheck™ feature.
- Use Virtual Scrolling to scroll through documents without using the scrollbar.
- Monitor finger movement and pressure with Mood Pad and Pressure Graph.
- Adjust the touch sensitivity from light to heavy.
- Disable or enable individual tap gestures for left-button click and drag.
- Turn drag-lock on or off.
- Turn Edge Motion on or off.
- Control Edge-Motion speed with slight changes in finger pressure.
- Assign special actions to the physical buttons and tap zones.
- Use fast pointer refresh rate for smoother cursor motion.
- Scroll up and scroll down using the integrated button switches.

See Synaptics device *Driver Functional Specification* (PN 520-000590-01) for a complete description of the driver features.

TouchPad Specifications

Environmental Specifications

Subject	Minimum	Maximum
Operating Temperature	0° C	60° C
Operating Humidity (relative, non-condensing)	5%	95%
Storage Temperature	-40°C	+65°C
ESD: Applied to front surface when mounted properly. See Mounting Considerations	N/A	15 kV
ESD handling spec: applied to components	N/A	4 kV

For more details see the *Environmental Testing Specification* (PN 520-000271-01).

Environmental Impact

This product is a “green” product built and manufactured in compliance with the Synaptics *Environmental Conservation Program Specification* (P/N: 520-000550-01). This document is continually updated in response to various worldwide requirements. For a current copy of this specification please contact your Synaptics Sales Representative.

Electrical Specifications

<u>Power Supply Voltage:</u>	5.0 Volt \pm 10%
<u>Power Supply Current:</u>	4.0 mA nominal operating
<u>Power Supply Ripple:</u>	100mV p-p Maximum
<u>Power Supply Rise Time:</u>	VDD must ramp up at greater than or equal to 1V/ms for the first 4V, remain above 4V thereafter, and settle to a value greater than or equal to 4.5V by the end of 20ms

Notes: (1) All current measurements are average current.

(2) Sleep with sensor wakeup may not be as responsive to finger input. System designer must evaluate appropriateness of this mode.

For more details, see the *Environmental Testing Specification* (PN 520-000271-01).

Operating Specifications

X/Y Position Resolution: 1000 points/inch (40 points/mm) (graphics tablet mode)

Interface: PS/2[®] (compatible with Microsoft[®] mouse driver)

Physical Specifications

Thickness	1.3 ± 0.15 mm PCB thickness (including Mylar cover). 4.6 mm max at highest component
Width	65.0 ± 0.3 mm rectangle 62.5 mm max bezel opening, 60.5 mm min bezel opening (Centered on TouchPad)
Height	49.0 ± 0.3 mm rectangle 46.5 mm max bezel opening, 44.5 mm min bezel opening (Centered on TouchPad)
Weight	Less than 12 grams

Facesheet Color Information

Standard Color: Ask your Synaptics sales representative for samples of standard colors.

Custom Color: Discuss custom color options with your Synaptics sales representative.

Underwriters Laboratories Inc. (UL)

Flame resistant rated UL 94V-0.

Physical Dimensions

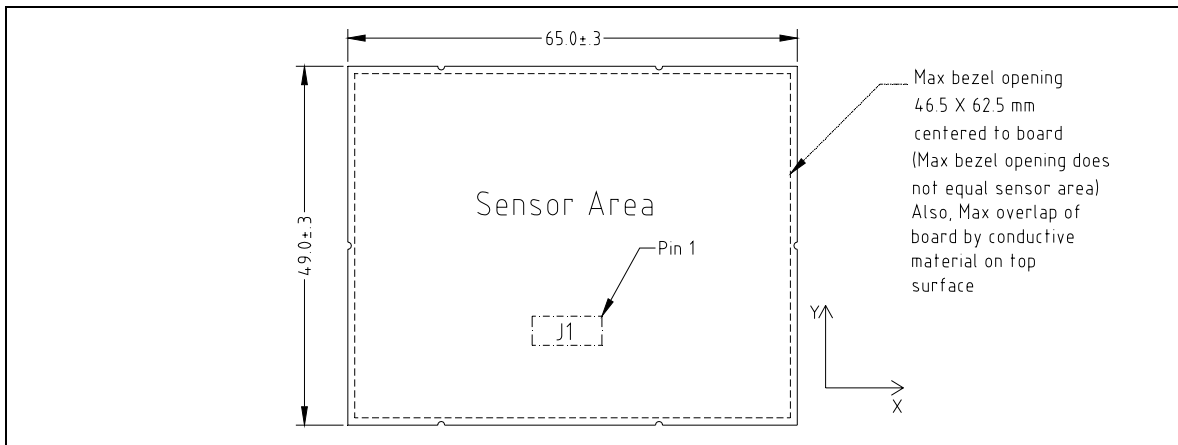


Figure 1. Sensor (Top) View

Note: Board dimension and Active Area shown. Hole dimension tolerance is $\pm 0.127\text{mm}$. All other Dimensions are $\pm 0.3\text{mm}$ unless otherwise noted.

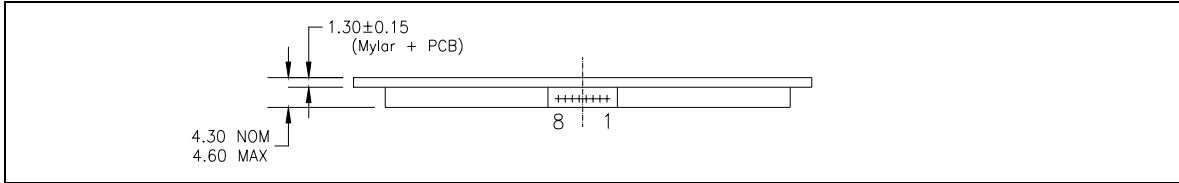


Figure 2. Side View

Note: Component heights are applicable only within component area. See bottom view for dimensions of component area.

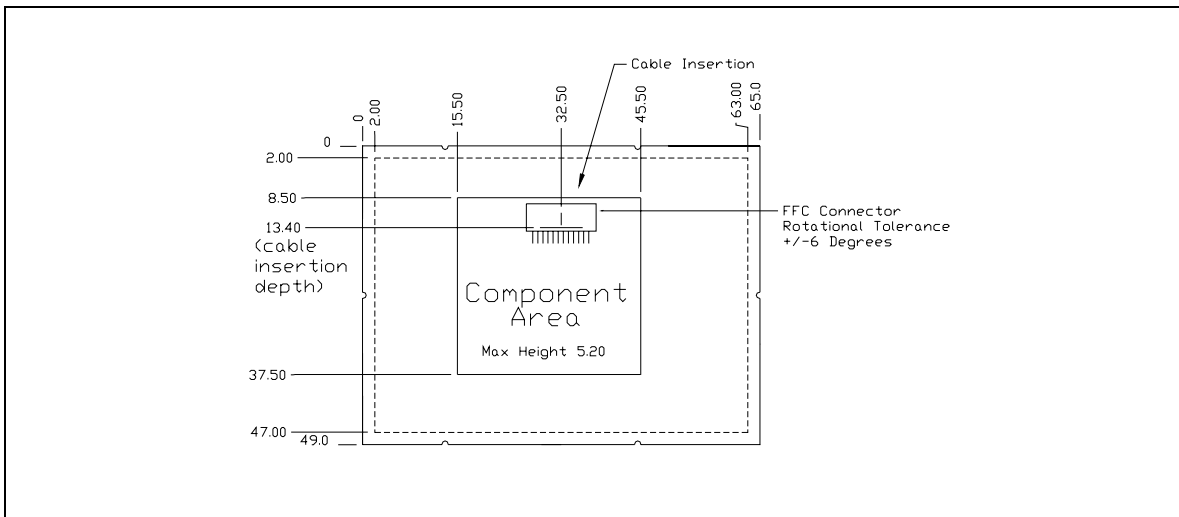


Figure 3. Component (Bottom) View

Note: All dimensions are in millimeters. Unless noted, all dimensional tolerances are $\pm 0.30\text{ mm}$.

Synaptics reserves the right to use components from various approved vendors and will guarantee all height restrictions of the component area are maintained. Designs should be held within the physical dimensions shown above. For mechanical samples, please contact Synaptics.

Firmware Specification

The Synaptics TouchPad communicates with the host via a standard PS/2 interface. Please refer to the *Synaptics TouchPad Interfacing Guide* for more information.

Connector Information

Connector J1

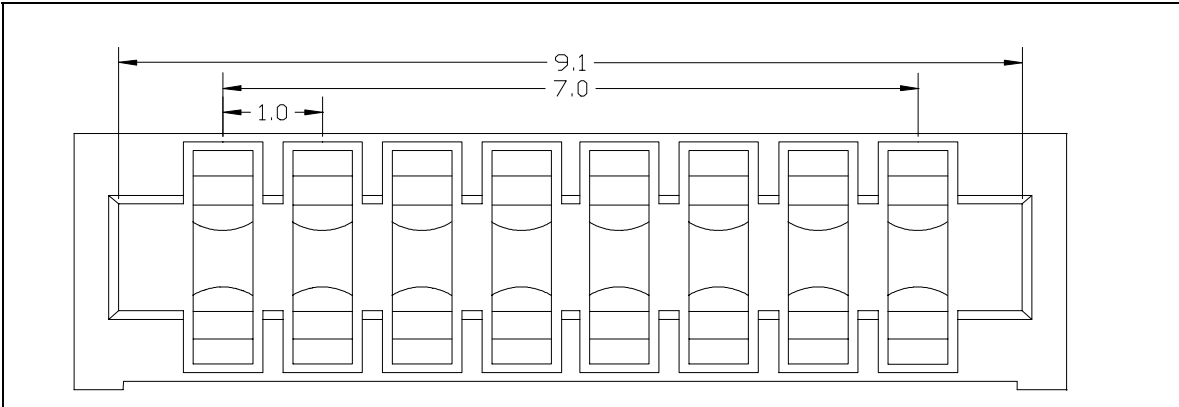


Figure 4. Module Connector J1-Reference

FFC/FPC Cable

All dimensions for FFC/FPC cables are in millimeters (mm). All dimensional tolerances are ± 0.125 mm unless noted otherwise.

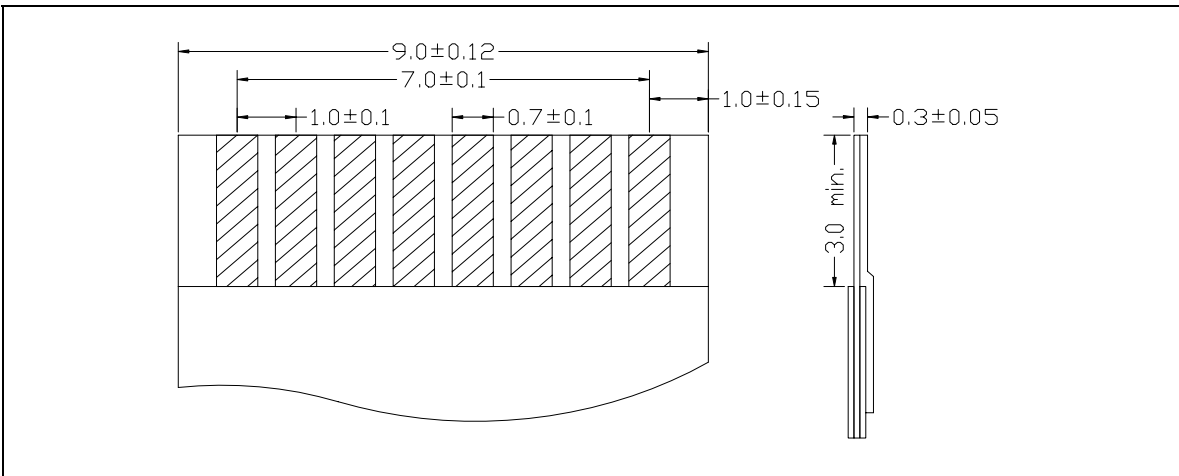


Figure 5. Dimensions of FFC/FPC Cable

Pin Assignment and Pin Definitions

The following table shows the pin assignments for the 8-pin FFC/FPC Cable attachment.

1	2	3	4	5	6	7	8
VDD	DAT	CLK	RIGHT	LEFT	GND	SCRL UP	SCRL DN

The following table shows the pin definitions for the 8-pin FFC/FPC Cable attachment.

CLK	PS/2 Clock
DAT	PS/2 Data
GND	Ground Input
LEFT	Left Button Switch Input
RIGHT	Right Button Switch Input
SCRL UP	Scroll UP Switch Input
SCRL DN	Scroll Down Switch Input
VDD:	Vdd Input

Mounting Considerations

Button Shape and Placement

The Synaptics tap and drag gestures, together with Synaptics' unique edge motion feature, eliminate most of the button operations for experienced users. This allows the buttons to be relatively small. The shape of the physical buttons that actuate the switches is left up to the case designer.

Bezel Shape and Alignment

The shape and alignment of the bezel are critical to the performance of the TouchPad because they provide tactile feedback to users when they have reached the edge of the pad. When using a TouchPad, the operator will naturally be looking at the computer screen and not at his or her hands. Tactile feedback is needed to prevent the user's finger from moving outside the TouchPad's active area.

To provide precise feedback, while still being comfortable to use, we recommend that the bezel be at least 1.5 mm high, and that it have rounded or steeply tapered edges. Gradually tapered edges encourage the user to slide his or her finger up into the bezel when he or she reaches the edge of the pad. This can result in unsatisfactory performance.

For the Synaptics EdgeMotion feature to operate properly, the opening in the bezel should be carefully centered over the TouchPad and should permit the center of the finger to move well past the edge motion threshold. Pay special attention to the bezel size.

Note: The bezel cannot contain any conductive materials

For more information, refer to the document *Inappropriate Materials for Use over Capacitive Sensors* (PN 506-000017-01).

TouchPad Mounting

The TouchPad should be firmly supported from below. This will keep the TouchPad from moving with heavy finger tapping. Please refer to the mounting areas for acceptable support structure locations.

Grounded brackets/materials should make contact with the TouchPad only in the Frame Ground area, which is connected to ground. Do not place conductive materials near the circuit traces on the component side or over any portion of the sensor (top side) of the TouchPad. Conductive material should never be closer than 1 mm to any components or the TouchPad PCB in the component or flat areas.

Please refer to the drawings showing the Mounting Region and frame ground on the TouchPad. The Mounting Region will remain free of components in future versions of TouchPad. All insulated clips, brackets, or posts used to support the TouchPad must make contact within this area. Metallic or otherwise conductive brackets or materials should make contact with the TouchPad only within the frame ground area. Do not place conductors on or near the circuit traces on the component side or over any portion of the sensor (top side) of the TouchPad.

Note: Synaptics must approve any mounting supports that deviate from these requirements.

For more information, refer to the document *Inappropriate Materials for Use over Capacitive Sensors* (PN 506-000017-01).

Electrostatic Discharge (ESD) Protection

For protection against electrostatic discharge (ESD) the TouchPad module must be properly shielded in its mount. There are two acceptable approaches to ESD protection: establish either a low impedance frame ground for the module itself, or place a ground ring between the bezel and the module.

Method 1

Provide a low impedance path to ground through the support for the TouchPad. This support should be made of conductive material and should contact the Frame Ground area on all four sides. The support must be connected to the system ground of the computer or device.

Method 2

Protect the TM~G350 module with a ground ring. Either the underside of the bezel should be metallized and then grounded, or else a thin metal shim should be placed between the module and the bezel. In either case, there must be a good connection from the ground ring to the frame ground of the host computer.

In addition to protecting the module from ESD events, the integrator must also provide ESD protection for external input buttons. This can be accomplished by surrounding the perimeter of the physical buttons with a low impedance path to ground.

For more information, see the *Environmental Testing Specification* (PN 520-000271-01).

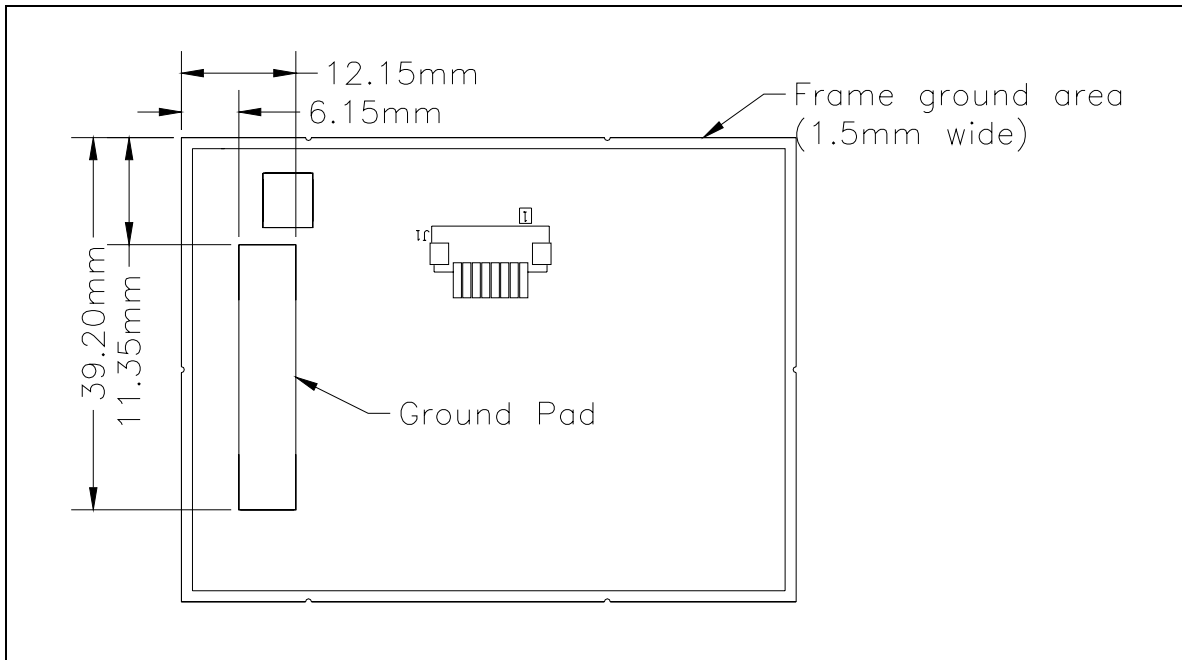


Figure 6. ESD Protection

Referenced Specifications

The following documents provide additional information:

- *Synaptics TouchPad Interfacing Guide.* (PN 510-000080-A)
- *Synaptics Device Driver Functional Specification* (PN 520-000590-01)
- *TouchPad Under Plastic: Application Note* (PN: 506-000012-01)
- *Environmental Testing Specification* (PN 520-000271-01)
- *Environmental Conservation Program Specification* (PN 520-000550-01)
- *Inappropriate Materials for Use over Capacitive Sensors* (PN 506-000017-01)
- *Synaptics Modular Embedded Protocol Specification* (PN 511-000009-01)

Note: Specifications subject to change without notice.

Ordering Information

For ordering information and a complete list of Synaptics' products, contact your Synaptics sales representative. To locate the Synaptics office nearest you, please visit our website.

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