



Product Specification
Model TM-03151-001

HID/I²C ClickPad Series 1.5
under facesheet

PN 510-003841-01 Rev 2

Revision History

ECO	Rev	Description	Firmware version	Release Date	Originator
64602	1	Preliminary draft	Product ID: 0x3151 Version ID: 0x0001 PR 1842492	Feb. 26, 2015	Pradhan PM Roxanne Huang
65889	2	FW tuning for 02rev1 PCBA	Product ID: 0x3151 Version ID: 0x0002 PR 1909018	Apr. 29, 2015	Pradhan PM Roxanne Huang

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ClickPad Reference Documentation

Document Number	Title
506-000012-01	TouchPad Under Plastic Design Guidelines: Synaptics Application Note
506-000015-01	Hover Test Description: Synaptics Application Note
506-000017-01	Inappropriate Materials for Use Over Capacitive Sensors: Synaptics Application Note
506-000236-01	ClickPad Integration Guidelines: Synaptics Application Note
506-000237-01	Synaptics TouchPad Integration Considerations
520-000271-01	Environmental Testing Specification
520-000322	TouchPad Handling Specification
526-000223-01	Quality Specification, Environmental Conservation Program

RMI4 Reference Documentation

Document Number	Title
511-000405-01	Synaptics RMI4 Specification: NDA

Note: These reference documents are subject to change without notice. For a current copy of one or more of these documents, contact your Synaptics sales representative.

Table of Contents

Section 1. General Product Description	4
ClickPad Series 1.5	4
Module Description.....	4
Section 2. Physical Specification	4
Module Drawing	4
PCB Specifications.....	6
Polyester Film Facesheet Design	6
Section 3. Connecting Interface	6
Connector on Synaptics PCB.....	6
J1 Pin Assignments and Definitions.....	6
Section 4. Electrical Specification	6
Section 5. Firmware and Communication Interface	錯誤! 尚未定義書籤。
Interface Protocol	錯誤! 尚未定義書籤。
Orientation and Button Layout	錯誤! 尚未定義書籤。
Default Settings	錯誤! 尚未定義書籤。
Low Power/Doze Mode	錯誤! 尚未定義書籤。
Button Functionality	錯誤! 尚未定義書籤。
GPIO Button	錯誤! 尚未定義書籤。
Scan Frequency	錯誤! 尚未定義書籤。
Product Info Inquiry	7
Section 6. Environmental Specification.....	10
Environmental Compliance	10
Regulatory Compliance.....	10
Section 7. Environmental Conditions	10

Section 1. General Product Description

ClickPad Series 1.5

The Synaptics ClickPad™ Series 1.5 integrates a tactile button into the PCBA sensor and enables the customers to implement their own mechanical hinge design. ClickPad Series 1.5 delivers the thinnest possible mechanical design that minimizes z-height limitations for space-constrained designs. It also incorporates image sensing (IS) technology.

ClickPad can be used for scrolling, pointing, navigation, and selection, just like a Synaptics TouchPad™—but a ClickPad eliminates the need for physical buttons. Pressing down on the ClickPad activates its internal switch to perform a left- or right-button click. The button-less design is sleek, intuitive, and easy to use because it feels similar to pressing a physical button. This makes ClickPad an excellent alternative to conventional input and navigation devices.

Module Description

Synaptics ClickPad modules contain the PCBA. The PCBA includes the Synaptics proprietary application-specific integrated circuit (ASIC) with discrete components. The solution also provides an electrical connection suitable for mating to a connector in the host system. Customers may be responsible for procurement/manufacture and design of all other module elements listed below, and are strongly encouraged to share this design and samples with Synaptics in order to maintain accurate product specifications and function. The firmware in the ASIC is customized to work with a specific combination of PCBA and sensor per the Synaptics-supplied Bill of Materials.

The Synaptics capacitance-sensing ASIC is fully self-contained. The proprietary microcontroller leverages proprietary Synaptics firmware (with in-system reprogrammable FLASH). The firmware provides support for calibrating and operating the capacitance sensors, computing finger position and motion, and using the digital I/Os to scan buttons, operate peripherals, and communicate with the host system.

The TM-03151-001 module is a Synaptics ClickPad under polyester film (like Mylar®). TM-03151-001 uses the Synaptics human interface device (HID)/I²C protocol. When complete, this product will be used in a notebook PC. This module supports advanced single-finger and multiple-finger gestures. Synaptics provides the sensor on FR4.

Section 2. Physical Specification

Module Drawing

Synaptics reserves the right to use components from various approved vendors, and guarantees that all height restrictions of the component area will be maintained. Designs should be held within the physical dimensions shown in the mechanical drawing. The mechanical drawing is Synaptics and customer approved, and is based on the latest information provided by the customer.

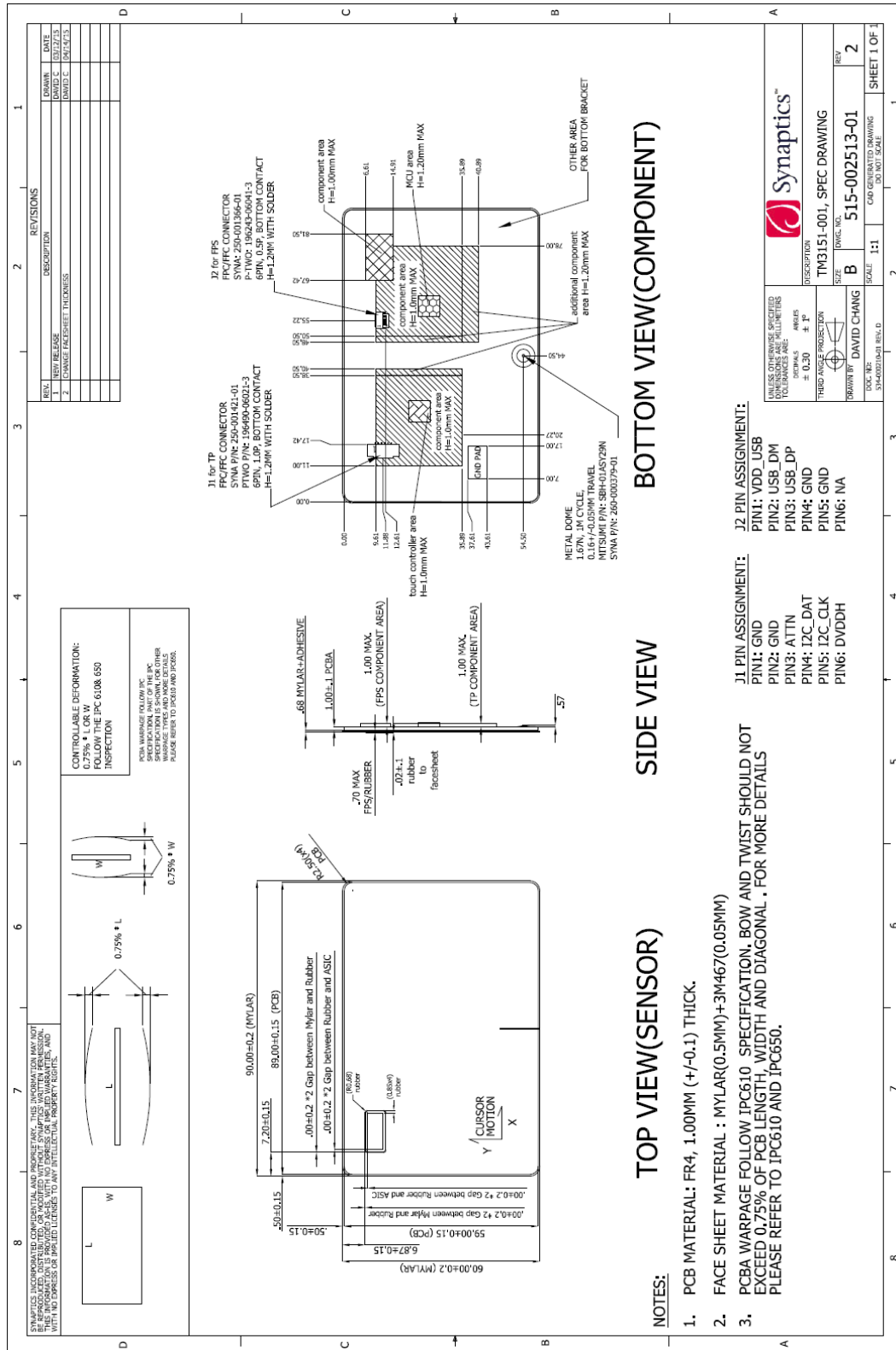


Figure 1. Module Views

PCB Specifications

Overall Dimensions	Width 89 mm \pm 0.15 mm Height 59 mm \pm 0.15 mm
Active Area Dimensions	Width 87 mm Height 57 mm
Sensor Thickness, including adhesive	1.55 mm
Module Substrate	FR4 1.0 mm

Polyester Film Facesheet Design

Dielectric Material Thickness	0.68 mm (+0.075 mm/ -0.05 mm)
Material Type	Polyester film

Note: Polyester film design is based on information provided by the customer.

The product case material and coloration **must be free of conductive materials** in the area over the sensor. The use of conductive material will severely degrade performance.

Section 3. Connecting Interface

Connector on Synaptics PCB

Name	Pins	Connector Type	FFC/FPC Cable	Manufacturer	Part Number
J1	6	Bottom contact	6pin,1.0P, BOT CONTACT, H=1.2 mm	P-TWO	P TWO_196490-06021-3 SYNA:250-1421-01
J2	6	Bottom contact	6pin,0.5P, BOT CONTACT, H=1.2 mm	P-TWO	P TWO_196243-06041-3 SYNA:250-1366-01

For more information about the connector, see the manufacturer's specification.

J1 Pin Assignments and Definitions

Pin Number	Pin Name	Description
1	GND	Ground
2	GND	Ground
3	ATTN	Attention
4	I2C_DAT	Data
5	I2C_CLK	Clock
6	DVDDH	Power

For more information about the connector, see the manufacturer's specification.

J2 Pin Assignments and Definitions

Pin Number	Pin Name	Description
1	VDD_USB	Power for USB
2	USB_DM	
3	USB_DP	
4	GND	Ground
5	GND	Ground
6	NA	NA

Section 4. Electrical Specification

Power Supply Voltage	VDD: 3.3V ± 1%
Power Supply Current	Active 15 mA max, with one finger present Normal Operation 1 mA typical
Power Supply Ripple	100 mV p-p Maximum
Power Supply Rise Time	The power supply must start from less than 1.2V, and once above must rise monotonically to VDD (specified above) within the 20 ms. Thereafter, it must stay strictly within the range specified for VDD above.

Note 1: All current measurements are time averaged. Typical report rate is 100 Hz.

Note 2: Normal Operation mode may not be as responsive to finger input as the Active mode since the sensor periodically wakes up from a low power mode. The system designer must determine whether or not this mode is appropriate for usage in the target design.

Section 5. Firmware and Communication Interface

The Synaptics ClickPad communicates with the host via a standard HID/I²C interface.

Interface Protocol

Interface/Communication Protocol	HID/ I ² C
Physical Layer	I ² C
Address	\$2C
Physical Layer Options	Slave Only, Attention Active Low, Open Drain

Lockdown Details Included (in addition to those indicated above)	
Product ID	TM3151-001

Family	1
Revision	1
GPIOs, Attention Pin?	IO:A11, Pin:3

Orientation and Button Layout

The reported coordinates are:

Reported Coordinates (coordinates scaled to the sensor active area)	
X	0- 1741
Y	0-1140

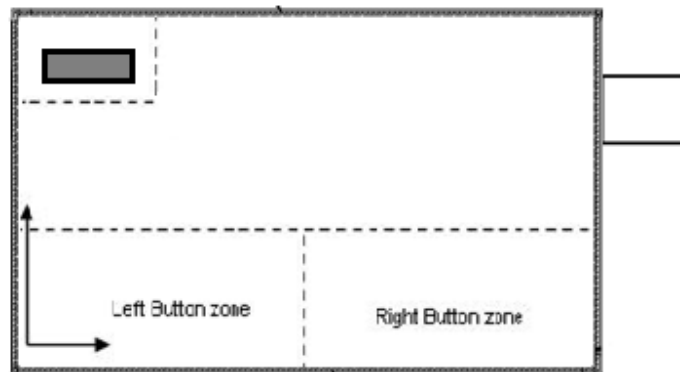


Figure 2. ClickPad orientation

(0, 0) is reported at the bottom left corner (with flex coming out from top left corner).

The Synaptics module refreshes data up to 100 times/second by default.

While the firmware generates updates at a fixed rate, ATTN signaling may vary due to module calibration variances ($\pm 5\%$) and by host performance and activity (potentially unbounded).

Button Functionality

The firmware supports button functionality in absolute mode when the Synaptics driver is installed. In relative (native mouse) mode, button zones are 17 mm from bottom edge, and are separated 43.5 mm from left edge/at sensor mid-point.

When the left button zone is pressed to activate the mechanical switch, the ClickPad reports a left-button press. When the right button zone is pressed in conjunction with the mechanical switch, the ClickPad reports a right-button press. Touching the virtual button zones without activating the mechanical switch does not result in a button report to the host. Activating the mechanical switch using non-conductive material does not result in a button report to the host.

Default Settings

The TM-03151-001 product supports the following settings and functions. For more details, refer to the *Synaptics RMI4 Specification: NDA* (PN: 511-000405-01).

- Receivers and transmitters specified in order
- Analog parameters set with the ability to report constant at a maximum rate of 100 Hz
- Sensor tuning:
 - 6.6 mm finger diameter used as small finger during Z and W scaling
 - 17 mm finger diameter used as large finger during Z and W scaling
 - 6.6 mm default finger size
- Image Data Reporting.
- Reports position for five fingers to the host.
- Supports ACM2.0
- supports single-finger gestures

The TM-03151-001 product does not support the following settings and functions.

- Palm Detect does not support and the values found in the F\$11 Palm Detect Threshold registers are not valid.
- Function \$51 is not available. The registers are all reserved.

GPIO Button

If applicable, include:

- GPIO numbering: 2
- Pin number: A1

Product Info Inquiry

For complete information on RMI Product Info Inquiry, please refer to the *Synaptics RMI4 Specification: NDA* (PN: 511-000405-01).

Release	Physical Layer Values	580 PN	HW for tuning	Description
ES1	Vendor ID: 0x06cb Product ID: 0x7B17 Version ID: 0x0001 PR 1842492	NA	920-003107-01 rev1	Initial rls
SIT	Vendor ID: 0x06cb Product ID: 0x7B17 Version ID: 0x0002 PR 1909018	NA	920-003107-02 rev1	FW tuning for new 02rev1 PCBA

Section 6. Environmental Specification

Environmental Compliance

This Synaptics product is built in compliance with the RoHS Directive and *Quality Specification, Environmental Conservation Program* (PN: 526-000223-01). This Synaptics product is also Halogen-Free compliant.

Regulatory Compliance

This module complies with the following regulations:

- CSA
- TUV
- Underwriters Laboratories, Inc. (UL)

Section 7. Environmental Conditions

Subject	Minimum	Maximum
Operating Temperature	0°C	60° C
Operating Humidity (relative, non-condensing)	5%	95%
Maximum Operating Temperature and Humidity (non-condensing)		45° C @ 95 %
Thermal Ramp Rate		2° C / min
Storage Temperature	-40°C	+65°C
Storage Temperature and Humidity		60° C @ 95 %
ESD Rating for: Standard Facesheet		12 kV

Note 1: ESD is applied to the front surface of the sensor module when properly mounted.

Note 2: As tested with the Synaptics driver; results may vary if a different driver is used.

ESD and EMI Protection

All exposed touch sensors require special attention to Electrostatic Discharge (ESD) and Electromagnetic Interference (EMI).

The interior of the device's front and back casing should be coated with a grounded conductive layer for EMI and ESD protection. Some openings in the conductive layer are allowed or required, but the coating should surround all openings and joins in the plastic that would permit electrical discharge to reach the sensor.

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

If the sensor is not properly grounded, it will not meet Synaptics ESD specifications. Refer to the *Synaptics TouchPad Integration Considerations* (PN: 506-000237-01) for additional information.