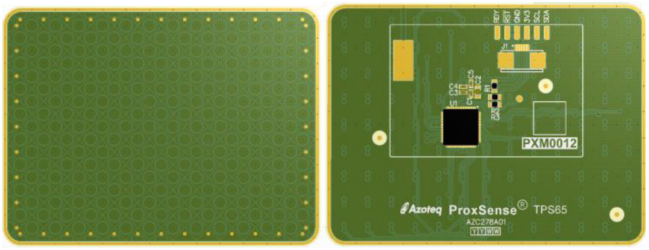
PROXSENSE® STANDARD TRACKPAD MODULE DATASHEET

ProxSense® Capacitive Trackpads with XY Coordinate, Gesture Recognition & Patented Snap / Push Button Detection

The ProxSense® series of capacitive trackpads offer best in class sensitivity, signal to noise ratio and power consumption. Automatic tuning for sense electrodes guarantees optimal operation over production and environmental changes.

Main Features

- Trackpad with on chip XY coordinate calculation
- 3072 x 2048 resolution (TPS65)
- 100Hz typical report rate (TPS65)
- Adjustable sensitivity
- Proximity wake up from low power
- Automatic recalibration for environmental changes
- 1 & 2 Finger Gesture Detection
  - Swipe
  - Tap
  - Press & Hold
  - Pinch & Zoom
  - Scroll Gestures
- Up to Fast I^2C (400kHz) Interface
- Optional Snap Overlay
- Low Power, suitable for battery applications
- Supply voltage: 1.65V to 3.6V
- <40µA active sensing LP mode
- I^2C interface to BlueTooth SoC



RoHS 2 Compliant

Applications

- Micro Projectors
- Remote Controls
- Printers & White Goods
- Mechanical Push Button Replacement

Contents

Datasheet Revision History

Version	Description	Date
1.00	First Release	June 2015
1.01	Updated Ordering Information	September 2015
1.02	Fixed PXM0013 pictures, updated Contact Information	November 2020
1.03	Template Update	March 2021
1.04	Update Figure 2-1 and Table 2-1	December 2022
1.05	Add glass overlay option and Template update	April 2023

1 Hardware Description

The trackpad modules are constructed on RoHS2 and REACH compliant FR4 PCB material. The module PCBs are 1mm thick and have an ENIG finish with a hotbar footprint and ZIF (zero insertion force) connector. The standard modules are not Halogen free.

Table 1.1: Summary of Trackpad Offerings

Module Name	Shape	Size	Touch IC	Resolution
TPS43	Rectangular	43mm x 40mm	IQS572	2048 x 1792
TPS65	Rectangular	65mm x 49mm	IQS550	3072 x 2048

Table 1.2: Summary of Trackpad Overlay Offerings

Overlay Option	Description	Stack-Up
Adhesive	3M Adhesive supplied with liner and pull tab	A
Mylar Overlay	0.2mm Mylar adhere to module with 3M double sided adhesive	B
4mm Metal Dome for TPS43 only	Metal Dome sheet added on top of Isolation Film	C
Printed Rubber Overlay for TPS43 only	Black Overlay with Snap Keys	D
Glass Overlay	0.7mm Glass adhered to module with 3M double sided adhesive	E

1.1 PCB Specifications

All modules offered adhere to the following PCB specifications:

- Material: 2-layer, FR4 PCB (not Halogen free material)
- Conductor: 35µm Copper (1oz. Cu)
- Finish: ENIG
- Size: Module Specific
- PCB Final Thickness = 1.0mm +/- 10%
- Outline: Precision DIE-CUT Profile

1.2 Adhesive Specification

The modules offered are supplied with double sided adhesive applied on the trackpad for ease of integration. The adhesive is kept with the liner in place, with a pull tab for easy removal without tearing:

- Type: 3M 468 200MP
- Thickness = 0.13mm
- Liner = Polycoated Kraft Paper
- Liner w/ Pull-Tab (No glue on Pull-Tab)
- Adhesive sized to fit entire tracking area (module specific)

1.3 Stack-Up A Thickness

The total thickness given in Figure 1.1 does not include the protective liner on the adhesive, as this liner needs to be removed when the module is assembled into the application. The highest part (thickest part of the module) of the assembly is located at the 0603 capacitor – C2. Please refer to the module STEP file for a 3D drawing indicating component positions. (Available on request.)

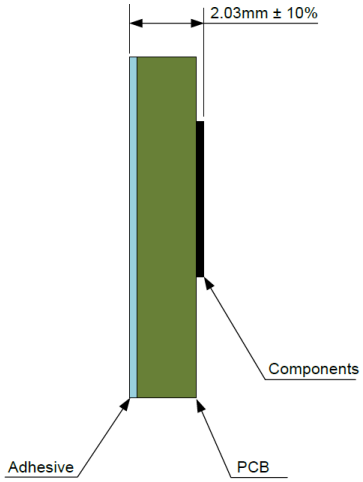


Figure 1.1: Stack-Up (A) - Thickness: PCB + 3M double sided adhesive

1.4 Stack-Up B Thickness

The total thickness given in Figure 1.2 includes the Mylar overlay, PCB and component heights. The highest part (thickest part of the module) of the assembly is located at the 0603 capacitor – C2. Please refer to the module STEP file for a 3D drawing indicating component positions.

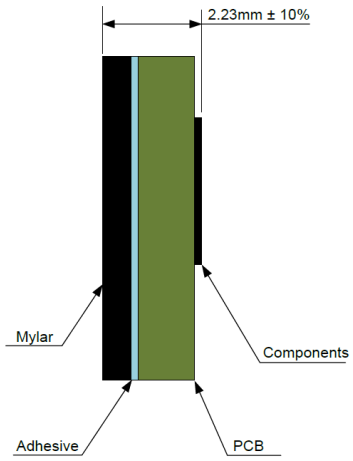


Figure 1.2: Stack-Up (B) - Thickness: PCB + 3M double sided adhesive + Mylar overlay

1.5 Stack-Up C Thickness

The total thickness given in Figure 1.3 indicates the height from the top of the metal domes, including PCB thickness and component heights. The highest part (thickest part of the module) of the assembly is located at the 0603 capacitor – C2.

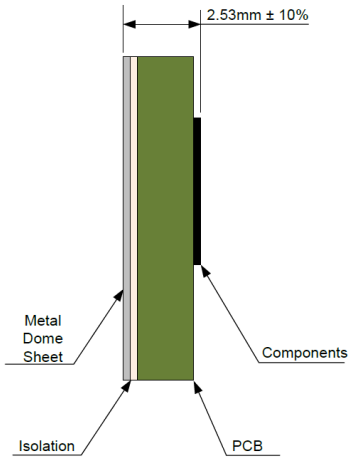


Figure 1.3: Stack-Up (C) - Thickness: PCB + isolation + metal dome sheet

1.6 Stack-Up D Thickness

The total thickness given in Figure 1.4 is the same as for stack-up C, with the addition of the 0.2mm printed rubber key mat. The highest part (thickest part of the module) of the assembly is located at the 0603 capacitor – C2.

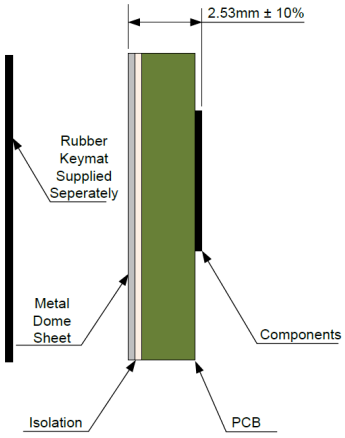


Figure 1.4: Stack-Up (D) - Thickness: PCB + isolation + metal dome sheet

1.7 Stack-Up E Thickness

Similar stack-up as stack-up B, but with 0.7mm Glass Overlay instead of 0.2mm Mylar Overlay. New total thickness is 2.73mm $\pm$ 10%.

1.8 Compatible Overlay Thickness

TPS65 and TPS43 support up to 3mm overlays, but is optimised for 1mm.

1.9 Finger Sizes

Table 1.3: Module Compatible Finger Sizes

Module	Min Finger	Min Finger Separation
TPS43	6.5 mm	12 mm
TPS65	7.0 mm	12.9 mm

2 TPS43

The TPS43 is a 43mm x 40mm rectangular trackpad with rounded corners. A representation of the module can be found in Figure 2.1 and Figure 2.2.

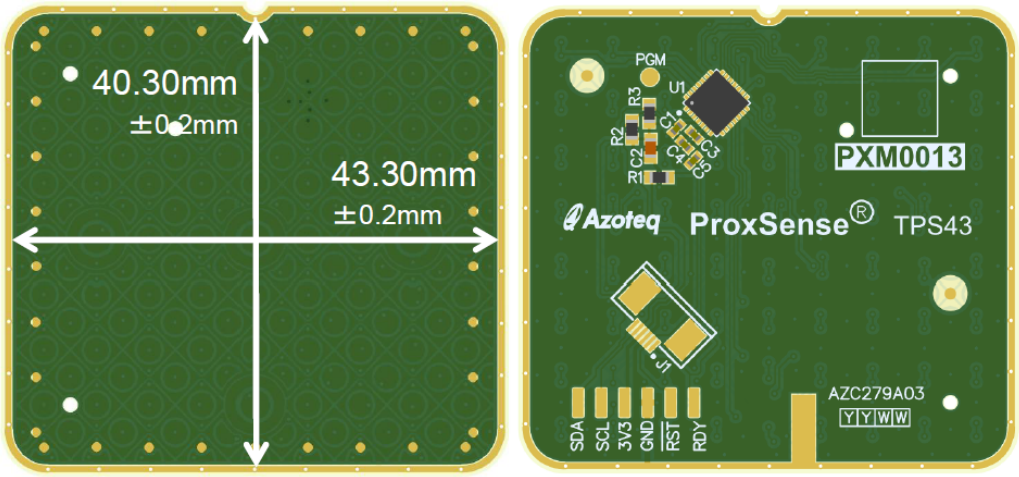


Figure 2.1: TPS43 – Module representation for metal dome overlay

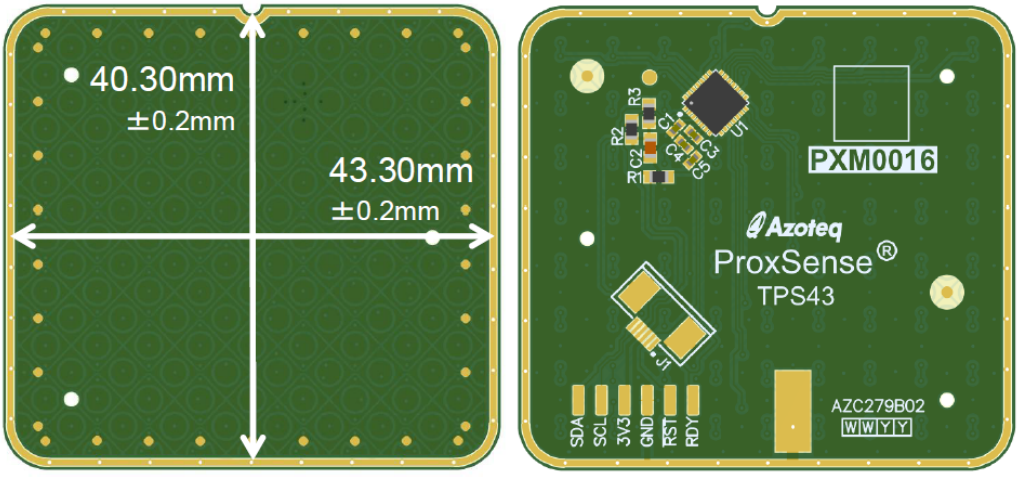


Figure 2.2: TPS43 – Module representation for mylar overlay

Table 2.1: FPC connector pin out for TPS43

J1	Connection
1	RDY
2	NRST
3	GND
4	VDDHI
5	SCL
6	SDA

3 TPS65

The TPS65 is a 65mm x 49mm rectangular trackpad with rounded corners. A representation of the module is shown in Figure 3.1.

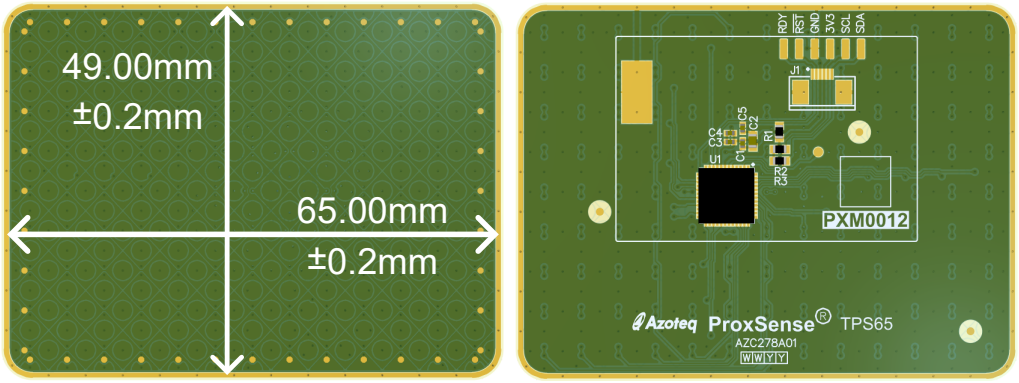


Figure 3.1: TPS65 – Module representation

Table 3.1: FPC connector pin out for TPS65

J1	Connection
1	RDY
2	NRST
3	GND
4	VDDHI
5	SCL
6	SDA

4 Gestures and Implementation

The TPS65 and TPS43 provides filtered XY coordinates for up to 5 fingers, which makes it ideal to be used for mouse pointer applications. It also supports gesture recognition, as shown below. For more information about the gestures, see the IQS5xx-B000 datasheet: IQS5XX-B000 Trackpad Datasheet

4.1 Swipe Gestures

The trackpad modules can recognise 1 finger gestures. A valid gesture generates an interrupt event.

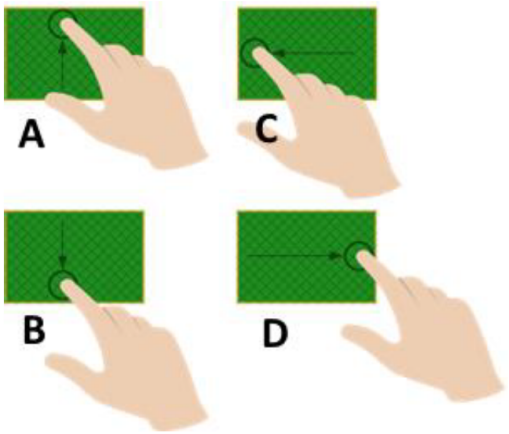


Figure 4.1: 1 Finger swipe gestures

4.2 Tap Gesture

The trackpad module can recognise a tap gesture, from a single finger, at any point on the trackpad surface. A valid tap generates an interrupt event.

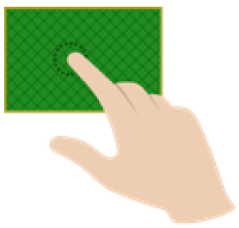


Figure 4.2: Tap gesture

4.3 Press and Hold Gesture

The trackpad module can recognise a press & hold gesture, from a single finger, at any point on the trackpad surface. A valid press & hold generates an interrupt event.

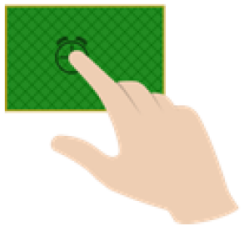


Figure 4.3: Press & Hold Gesture

4.4 Pinch & Zoom

A pinch gesture is reported when two touches move closer together, and a zoom gesture is reported when they move apart.

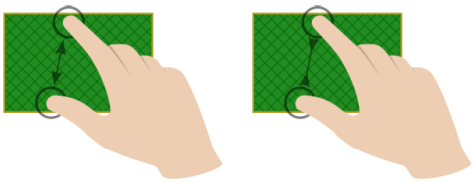


Figure 4.4: Pinch and Zoom Gesture

4.5 Scroll Gestures

The trackpad modules can recognise scroll gestures. A valid gesture generates an interrupt event.

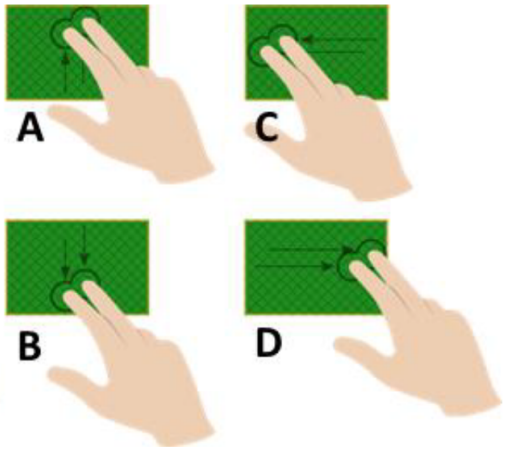


Figure 4.5: 2 Finger scroll gestures

5 Specifications

5.1 Absolute Maximum Specifications

The following absolute maximum parameters are specified for the device:

Exceeding these maximum specifications may cause damage to the device.

- Operating temperature: -40°C to 85°C
- Supply Voltage (VDDHI – GND): 3.6V
- Minimum power-on slope: 100 V/s
- ESD protection: ±2kV (Human body model)

5.2 Application Level Tests

According to the module design, with proper application system design implementation a 16kV IEC air discharge and 1Vp-p Conducted Immunity level should be possible to achieve.

5.3 Power Consumption

Table 5.1: Trackpad Module General Operating Conditions

DESCRIPTION	MIN	TYP	MAX	UNIT
Supply Voltage	1.65	3.3	3.6	V
Tracking Mode Current	1.89	2.23	2.56	mA
Low Power Current	-	23	-	µA

Please note that the above mentioned current consumption was measured on the TPS65 module with the following setup:

- Module forced into:
  - Active Mode for Tracking Mode Current measurement
  - LP2 for Low Power Current measurement[1]
- No finger on the trackpad.
- Event Mode Comms communication selected.

Table 5.2: Start-up and shut-down slope Characteristics

DESCRIPTION	Conditions	PARAMETER	MIN	MAX	UNIT
Power On Reset	V_{DDHI} Slope $\geq$ 100V/s @25°C	V_{POR}	1.44	1.65	V
Power Down Reset	V_{DDHI} Slope $\geq$ 100V/s @25°C	V_{PDR}	1.30	1.60	V

[1] LP2 Report Rate set to 160ms

6 Ordering Information

Order quantities will be subject to MOQ of 5k pcs. Contact the official distributor for sample quantities. A list of the distributors can be found under the Sales section of Azoteq website.

TPSyy-hss-x

Trackpad Module	TPS	=	Trackpad
Size Indicator (yy)	43	=	43mm
	65	=	65mm
Hardware Revision (h)	1	=	Standard Module With Hot Bar
	2	=	Standard Module with ZIF Connector
Software Revision (ss)	01	=	Standard Gestures
Overlay Options (x)	A	=	No overlay, Adhesive only
	B	=	0.2mm Black Mylar
	C	=	Metal Dome Layer (4mm Domes)
	D	=	Metal Dome Layer with Rubber Mat
	E	=	0.7mm Glass
Overlay options C and D are only available for TPS43			

Note: For specifications regarding overlay options A-E or any other trackpad module requirements, please contact Azoteq directly.

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