# PXM0091 DATASHEET

Multi-Function Trackpad: Proximity, Touch, and Gesture Functionality

The IQS9150 is a generic and configurable trackpad device aimed to be suitable for numerous design variations and requirements. The PXM0091 utilises the IQS9150 to provide high-performance multi-touch (linearity, accuracy, low-noise) trackpad outputs, switch input, and an on-chip gesture recognition engine. The PXM0091 features best in class sensitivity, signal-to-noise ratio and automatic tuning of electrodes. The PXM0091 also has user configurable virtual buttons, sliders, and wheels that can be superimposed onto the trackpad area, with easy-to-integrate virtual sensor outputs. Low power proximity detection allows extreme low power operation.

Main Features

- XY coordinate calculation
- Self-/Mutual-capacitive sensors configuration for device wake-up
- Ultra Low Power (ULP) wake-up on touch
- Automatic recalibration for environmental changes
- 1 & 2 Finger Gesture Detection
  - Swipe
  - Tap, Double Tap and Triple Tap
  - Press & Hold
  - Pinch & Zoom
  - Scroll Gestures
- I^{2}C communication interface with IRQ/RDY, up to Fast-Mode Plus (1 MHz)
- Low Power, suitable for battery applications
- Wide input voltage supply range: 2.2 V to 3.5 V
- Trackpad
  - Up to 7 fingers tracking
  - High resolution coordinate outputs
  - Fast response
  - Individual touch sensor
  - Integrated touch size output (area and strength) for touch integrity
  - Multi-finger gesture recognition engine
  - Configurable coordinate resolution and orientation
  - Compatible with wide range of overlay materials and thicknesses
  - Adjustable sensing frequency offset for limiting potential interference
  - No calibration required - systems automatically compensated for mechanical & temperature changes
  - Virtual sensors:
    * Configurable virtual button, slider and wheel sensors
    * Change sensor locations and sizes without electrode changes required
    * Up to 16 virtual buttons
    * Up to 8 virtual sliders
    * Up to 4 virtual wheels
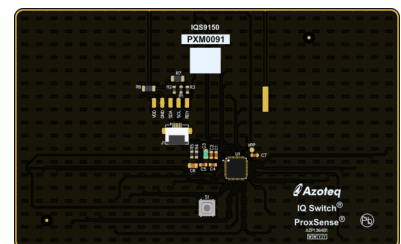
Applications

- Notebooks
- Tablet and notebook accessories
- Industrial and Specialised (Control panels, medical devices, aircraft cockpits)

1 Revision History

Release	Date	Comments
v1.0	2024/06/21	Initial Release
v1.1	2024/10/17	Updated Ordering Information

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2   Hardware Description

The trackpad modules are constructed on RoHS 2 and REACH compliant FR4 PCB material. The module PCBs are 1.55 mm thick and have an ENIG finish with test points and ZIF (zero insertion force) connector. The standard modules are not Halogen free.

Table 2.1: Summary of Trackpad Offerings

Module Name	Size	Touch IC	Resolution
PXM0091	120 mm x 75 mm	IQS9150	2000 x 1213 (max 6400 x 4352)
PXM0091 with Glass overlay	120 mm x 75 mm	IQS9150	2000 x 1213 (max 6400 x 4352)

Table 2.2: Summary of Trackpad Overlay Offerings

Overlay Option	Description	Stack-Up
None	3M Adhesive supplied with liner and pull tab	A
Glass Overlay	1 mm Glass adhered to module with 3M double-sided adhesive	B

2.1   PCB Specifications

All modules offered adhere to the following PCB specifications:

> Material: 2-layer, FR4 PCB (not Halogen free material)
> Conductor: 35 µm Copper (1oz. Cu)
> Finish: ENIG
> Size: 120 ± 0.13 mm x 75 ± 0.13 mm
> PCB Final Thickness = 1.55 mm ± 10%
> Outline: Precision DIE-CUT Profile

2.2   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 9448A
> Thickness = 0.15 mm
> Liner = Poly coated Kraft Paper
> Liner w/ Pull-Tab (No glue on Pull-Tab)
> Adhesive sized to fit entire tracking area

2.3   Glass Overlay

The glass overlay that is used by default on the PXM0091 has the following specifications:

> Thickness: 1.1 mm ± 0.15 mm
> Length: 121 mm ± 0.15 mm
> Width: 76 mm ± 0.15 mm
> Corner Radius: 2 mm ± 0.075 mm

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> Colour: Pantone® Cool Grey 11
> Anti-Glare and Anti-Fingerprint with:
>   • Gloss: 15.8 ± 5 GU
>   • Haze: 72.6 ± 10 HU
>   • Roughness: Ra 0.438 ± 0.2 µm

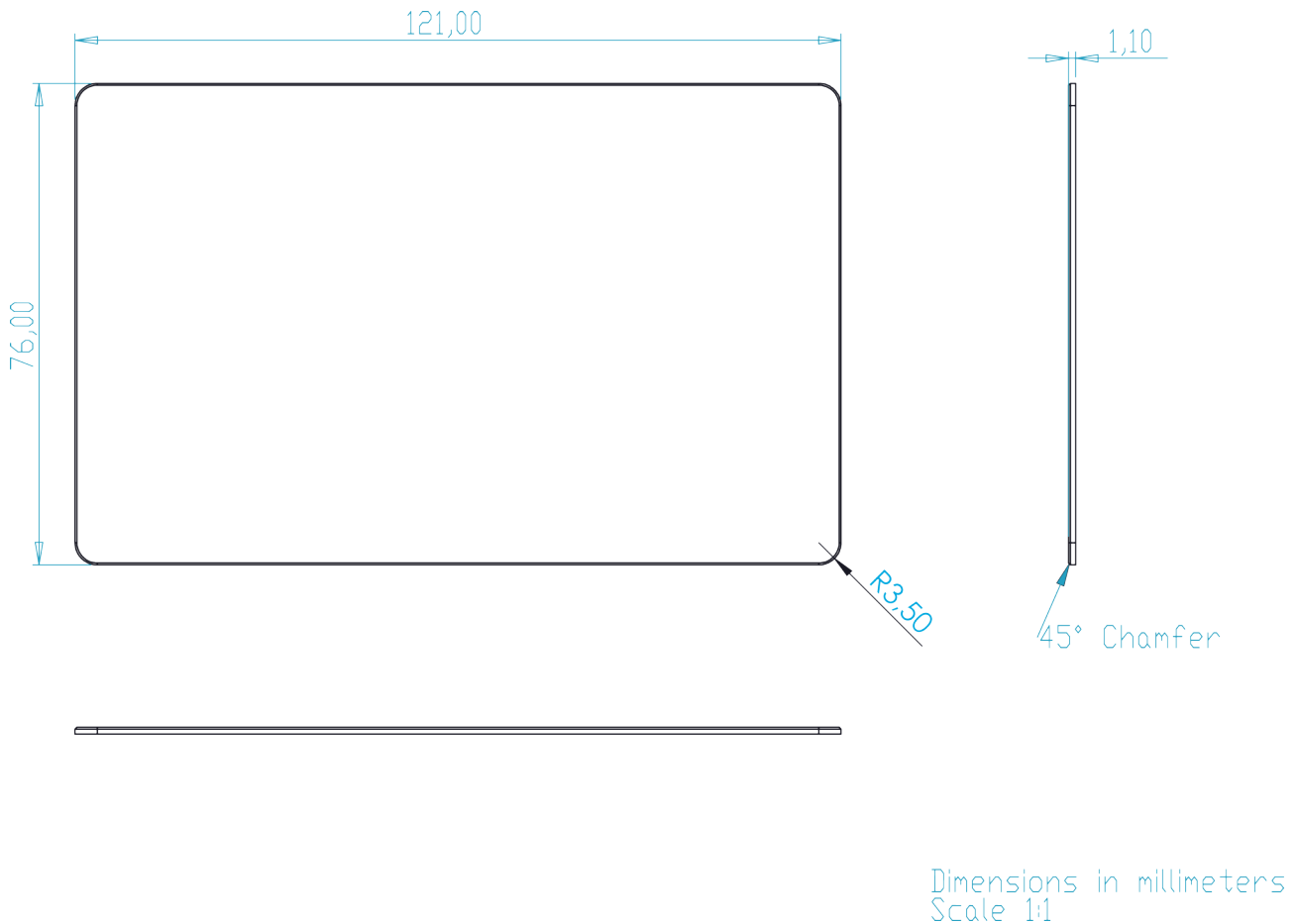A drawing of this overlay can be seen in Figure *2.1*.

Figure 2.1: Stack-Up (A) - Thickness: PCB + 3M double-sided adhesive

2.4   Stack-Up A Thickness

The total thickness given in Figure *2.2* 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 thickest part of the assembly is located at the ZIF connector, J1, which has a height above board of 2 mm. Please refer to the module STEP file for a 3D drawing indicating component positions. (Available on request.)
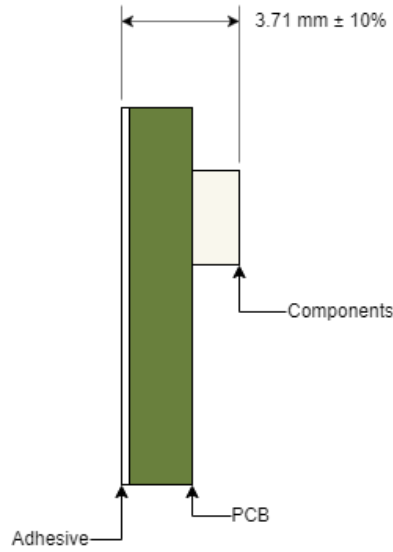
2.5   Stack-Up B Thickness

The total thickness given in Figure *2.3* includes the glass overlay, PCB and component heights. The thickest part of the module is located at the ZIF connector, J1, which has a height above board of 2 mm. Please refer to the module STEP file for a 3D drawing indicating component positions.

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Figure 2.2: Stack-Up (A) - Thickness: PCB + 3M double-sided adhesive
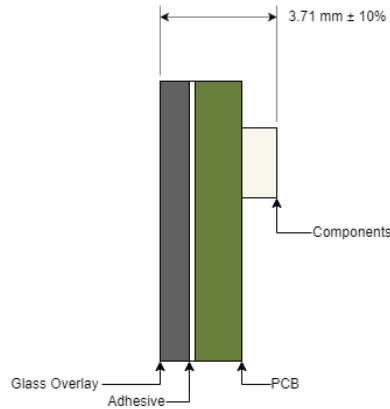

Figure 2.3: Stack-Up (B) - Thickness: PCB + 3M double-sided adhesive + glass overlay

2.6 Compatible Overlay Thickness

PXM0091 can support overlay thickness of 1 mm to 2 mm, but currently the configuration is optimised for 1 mm. If other overlays/thicknesses are used, the configuration might need to be adjusted.

2.7 Finger Sizes

Table 2.3: Module Compatible Finger Sizes

Min Finger	Min Finger Separation
6.5 mm	7 mm

3 PCB Layout

The PXM0091 is a 120 mm x 75 mm rectangular trackpad with rounded corners. A representation of the module can be found in Figure *3.1* and Figure *3.2*.

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Figure 3.1: PXM0091 Top View
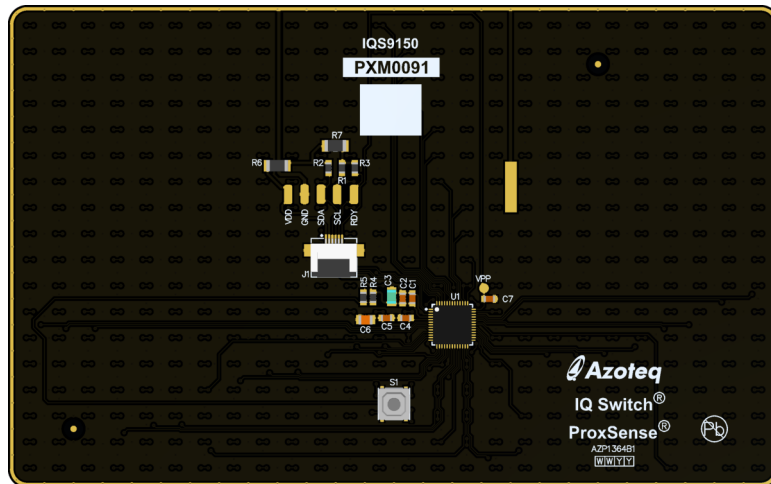
Figure 3.2: PXM0091 Bottom View

Table 3.1: FPC connector pin out for PXM0091

J1	Connection
1	VDD
2	GND
3	SDA
4	SCL
5	RDY
6	MCLR / VPP

4 Gestures and Implementation

The PXM0091 provides filtered XY coordinates for up to 7 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 features and gestures available on the module, see the IQS9150 datasheet.

4.1 Swipe and Swipe-and-Hold Gestures

The trackpad modules can recognise 1 finger swipe gestures, as well as swipe-and-hold gestures. The gestures are registered in the positive and negative X and Y axes. A valid gesture generates an interrupt event.
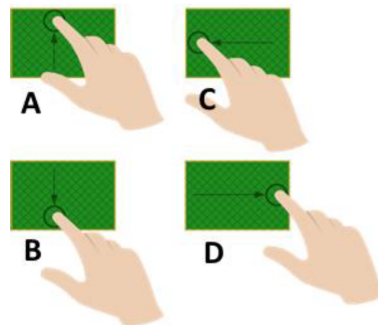
Figure 4.1: 1 Finger swipe gestures

4.2 Tap Gesture

The trackpad module can recognise a single tap, double tap and triple tap gesture, for both one and two finger taps, at any point on the trackpad surface. A valid tap generates an interrupt event.
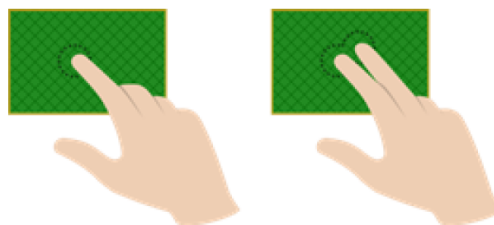
Figure 4.2: Tap gesture

4.3 Press-and-Hold Gesture

The trackpad module can recognise a press-and-hold gesture, from one or two fingers, at any point on the trackpad surface. A valid press-and-hold generates an interrupt event.
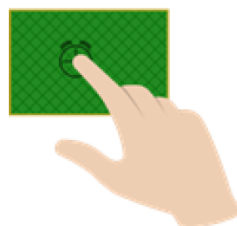

Figure 4.3: Press-and-Hold Gesture

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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.
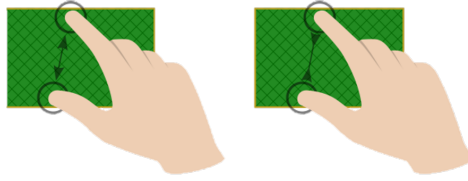

Figure 4.4: Pinch and Zoom Gesture

4.5   Scroll Gestures

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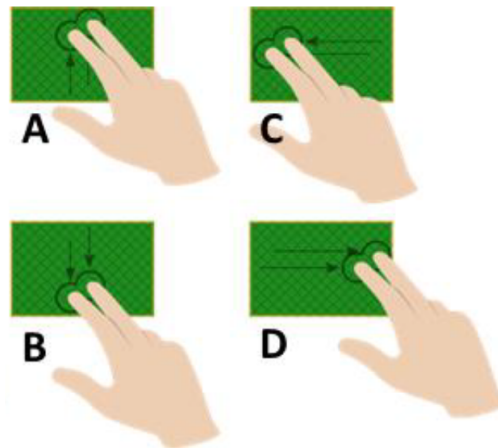

Figure 4.5: 2 Finger scroll gestures

5 Specifications

5.1 Absolute Maximum Ratings

The following absolute maximum parameters are specified for the device:

Exceeding these maximum specifications may cause damage to the device.

Table 5.1: Absolute Maximum Ratings

Symbol	Rating	Min	Max	Unit
V_{DD}	Voltage applied at VDD pin (referenced to VSS)	−0.3	3.6	V
V_{IN}	Voltage applied to any ProxFusion® pin (referenced to VSS)	−0.3	V_{REG}	V
	Voltage applied to any other pin (referenced to VSS)	−0.3	V_{DD} + 0.3 (3.6 V max)	V
T_{stg}	Storage temperature	−40	85	°C

5.2 Recommended Operating Conditions

Table 5.2: Recommended Operating Conditions

Symbol	Parameter	Min	Recommended	Max	Unit
V_{DD}	Standard operating voltage, applied at VDD pin	2.2[a]		3.6	V
T_A	Operating free-air temperature	−20		85	°C

[a] F_{osc} is set to 24 MHz on this module. If F_{osc} is lowered to 14 MHz, the minimum V_{DD} can be lowered to 1.71 V.

5.3 ESD Rating

Table 5.3: ESD Rating

			Value	Unit
$V_{(ESD)}$	Electrostatic discharge voltage	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001[a]	±2000	V

[a] JEDEC document JEP155 states that 500 V HBM allows safe manufacturing with a standard ESD control process. Pins listed as ±2000 V may actually have higher performance.

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5.4 Current Consumption

Table 5.4: Active and Idle Current Consumption

Mode	Sampling Period [ms]	Current Consumption
Active	10	8.7 mA
Idle-Touch	50	1.8 mA
Idle	50	1.7 mA
ALP LP1	50	110 µA
ALP LP2	100	12 µA

5.5 Reset Levels

Table 5.5: Reset Levels

Parameter		Min	Typ	Max	Unit
VDD	Power-up (Reset trigger) – slope > 100 V/s			1.65	V
	Power-down (Reset trigger) – slope < −100 V/s	0.9			

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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.

<u>PXM0091-hss</u>

Trackpad Module	PXM0091	=	Trackpad Module
Hardware Revision (h)	1	=	No overlay, Adhesive only
	2	=	1 mm Glass Overlay
Software Revision (ss)	02	=	Standard Software

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

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