IQS7222x Selection Guide

A comprehensive selection guide for choosing the optimal IQS7222x device. With "x" being a placeholder for one of 5 options in this family of devices, being A, B, C, D and E.

1 Introduction

The IQS7222x family is a range of ProxFusion® products that provide multiple sensing channels and capabilities in a single package. These devices all offer multiple self-capacitive and mutual-capacitive sensing channels, with specific products also supporting inductive sensing or Hall-effect sensing. They incorporate two independent ProxFusion® sensing engines, referred to as “Prox Engine A” and “Prox Engine B”. These engines allow two sensor channels to be measured in parallel, reducing the total scan time compared to a single-engine architecture.

The IQS7222x also features:

- I²C interface with interrupt/RDY signal
- Automatic sensor calibration (ATI)
- On-chip filtering and event detection
- On-chip automatic power mode switching ensuring optimal power consumption.
- Various UIs such as Sliders, Trackpads, and Reference Tracking for a variety of applications (product-specific)
- PC software for configuration and debugging

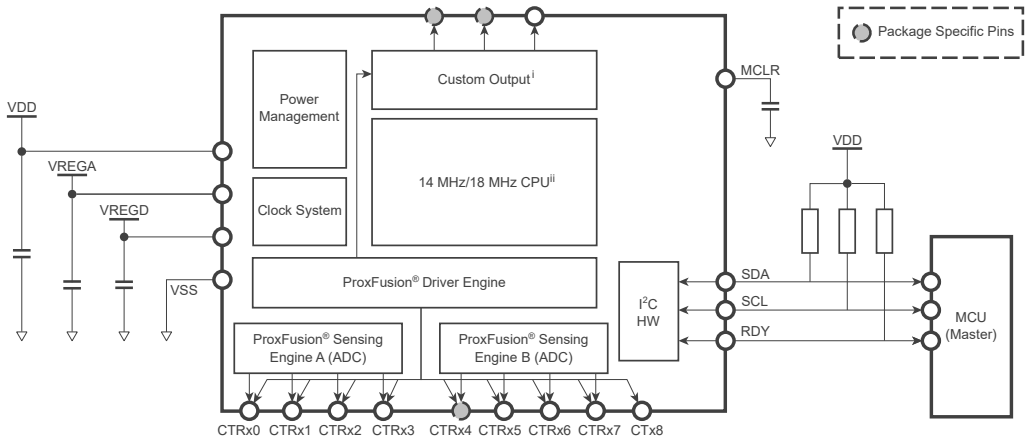

Figure 1.1: Block Diagram[i, ii, iii]

1.1 Channels vs. External Sensor Connections

In the IQS7222x, a channel is a logical sensing element defined in firmware. Each channel represents one proximity measurement and is configured by selecting:

- A Tx (transmit) electrode, which drives the excitation signal, and

[i] Output pins are dependent on the desired IQS7222x IC.
[ii] Only IQS7222B offers an 18 MHz clock that requires a higher input VDD voltage.
[iii] WLCSP18 packages do not have a CRX4 pin.

- An Rx (receive) electrode, which senses the coupled response.

External sensor connections refer to the physical device pins bonded out to electrodes on the PCB. Channels are mapped to these external pins through register configuration, but they are not equivalent: multiple channels may reuse the same external pins at different times, and not all pin combinations are permitted.

While any supported pin may be configured as a Tx electrode for either Prox engine, Rx pin selection is constrained. Only certain Rx pins may be used with each Prox engine, and not all channel-to-pin combinations are valid. The supported Rx pin assignments for each Prox engine are shown in Figure 1.1 and Table 1.1.

Table 1.1: Rx Prox Engine Relationship

CRx	Prox Engine A	Prox Engine B
CRx0	✓	-
CRx1	✓	-
CRx2	✓	-
CRx3	✓	-
CRx4	-	✓
CRx5	-	✓
CRx6	-	✓
CRx7	-	✓

1.2 Dual Prox Engine Timing Benefit

The presence of two prox engines allows the device to measure two channels simultaneously—one per engine—during each time slot. This parallel operation reduces the total time required to scan all enabled channels.

Example: Sampling eight channels over four time slots:

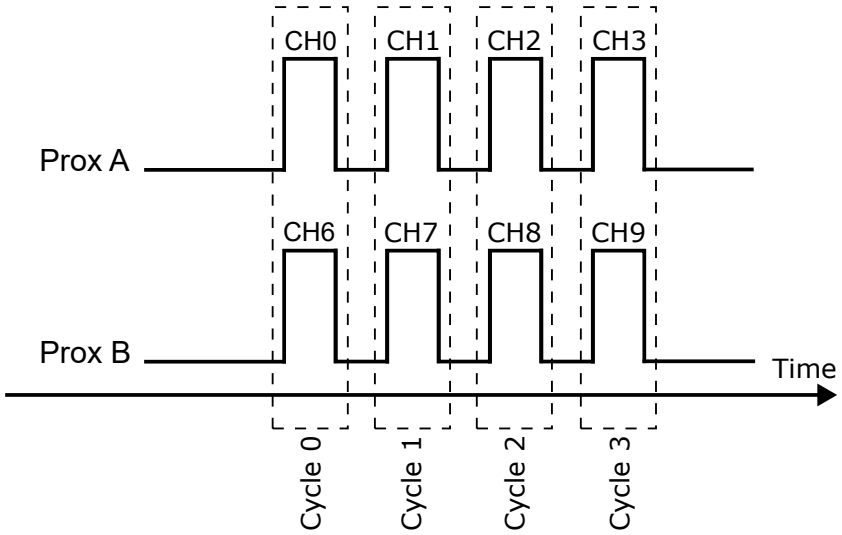

Figure 1.2: Time vs Sensing Events

Using a single prox engine, eight channels would require eight time slots. With dual prox engines, the

same eight channels are measured in four time slots, effectively halving the scan time. This improvement is particularly important for applications requiring fast response times or frequent updates.

Table 1.2 shows the cycle - channel relationship for the various IQS7222x products.

Table 1.2: Product Cycle and Channel Overview

	IQS7222A	IQS7222B	IQS7222C	IQS7222D	IQS7222E
Maximum Cycles	6	10	5	7	7
Prox Engine A Channels	CH0 → CH4	CH0 → CH9	CH0 → CH4	CH0 → CH6	CH0 → CH4
Prox Engine A Connections	CRx0 → CRx3	CRx0 → CRx3	CRx0 → CRx3	CRx0 → CRx3	CRx0 → CRx3
Prox Engine B Channels	CH5 → CH9	CH10 → CH19	CH5 → CH9	CH7 → CH13	CH5 → CH7
Prox Engine B Connections	CRx4 → CRx7	CRx4 → CRx7	CRx4 → CRx7	CRx4 → CRx7	CRx4 → CRx7
Internal Prox Engine Connections	Hall Sensor	None	None	None	Hall Sensor
Fixed channels	CH10 → CH11 (Hall)	None	None	None	Hall
Additional Tx Connections	Tx8	Tx8	Tx8	Tx8	Tx8

2 IQS7222x Features

Table 2.1 provides a brief comparison of the different features and applications provided by the IQS7222x variants.

Table 2.1: IQS7222x Product Comparison

Feature	IQS7222A	IQS7222B	IQS7222C	IQS7222D	IQS7222E
Primary Application	Multi-sensor fusion device	Multi-button keypads	Multi-sensor fusion device	Single finger gesture pads, non-ITO touch screens	Multi-sensor fusion device
Self-Capacitive Channels	8	8	8	8	8
Mutual-Capacitive Channels	10	20	10	14	8
Inductive Sensing Channels	4	No	4	4	No
Hall-Effect Switch	Yes[i]	No	No	No	Yes
Wear Detection Channels	4	No	4	No	3

[i] Relative Hall-effect sensing

Feature	IQS7222A	IQS7222B	IQS7222C	IQS7222D	IQS7222E
Additional Features	› Two sliders, up to four sensing elements each. › Slider gestures: • Single Tap • Swipe • Flick › Reference channel tracking. › Single GPIO output, which can be linked to channel states.		› Two sliders or wheels, up to four sensing elements each. • Slider coordinate output (without gesture detection). › Reference channel tracking. › Three GPIO outputs, which can be linked to channel states.	› Trackpad UI. › Up to 12 sensor elements. › XY coordinate output. › Single-finger gestures: • Taps • Swipes • Flicks › Three GPIO outputs, which can be linked to channel states.	› Reference channel tracking › "Setup complete" GPIO indication › Gesture events on CH0 or CH1: • Single tap • Double tap • Triple tap • Press-and-hold
Applications	› SAR Compliance in Mobile devices. › Low power wakeup events on proximity or touch. › User interfaces: • Capacitive sliders • Capacitive buttons • Inductive buttons › Wear Detection. › Hall-effect Dock Detection. › TWS Earphones: • Touch controls • Slider with gestures • Wear detection • Force/squeeze controls • Hall-effect dock detection	› Multi-button keypads or user interfaces. › Low power wake-up on proximity or touch.	› SAR Compliance in Mobile devices. › Wear Detection. › User interfaces: • Capacitive sliders • Capacitive buttons • Inductive buttons › Low power wake-up on proximity or touch.	› Trackpad and gesture-based user interfaces, e.g.: • Wearables • Navigation controls • Touch pads › Multi-button keypads and user interfaces. › Low power wake-up on proximity or touch. › Non-ITO small sized touch screens. › Edge touch screens for: • Wearables • Personal care products • TWS charging case • Remote controls	› SAR Compliance in Mobile devices. › Hall-effect magnet presence detection. › Wear Detection. › TWS Earphones: • Touch controls • Slider with gestures • Wear detection • Force/squeeze controls • Hall-effect dock detection › Low power wake-up on proximity or touch.

3 Revision History

Release	Date	Changes
v1.0	October 2025	Initial release
v1.1	January 2026	Added “Introduction” section (Section 1) Added “Channels vs. External Sensor Connections” section (Section 1.1) Added “Dual Prox Engine Timing Benefit” section (Section 1.2)

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