



IQS7211A OVERVIEW

Versatile Trackpad/ touchscreen controller with proximity,
touch, trackpad and gesture outputs

1 Device Overview

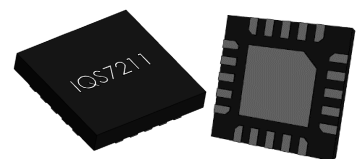
The IQS7211A ProxFusion® IC is a capacitive touch and proximity trackpad/touchscreen controller implementation. The IQS7211A features best in class sensitivity, signal-to-noise ratio and automatic tuning of electrodes. Low power proximity detection allows extreme low power operation.

1.1 Main Features

- > Highly flexible ProxFusion® device
- > 12(QFN) / 10 (WLCSP) external sensor pad connections
- > Self/Mutual capacitive sensors configuration for display wake-up
- > ULP wake-up on touch
 - Dedicated Ultra Low Power wake-up touch sensor or
 - Wake-up on screen/trackpad
- > Sensor flexibility
 - Automatic sensor tuning for optimum sensitivity
 - Internal voltage regulator
 - Reference capacitor
 - On-chip noise filtering
 - Detection debounce and hysteresis
 - Wide range of capacitance detection
- > Trackpad/Touchscreen
 - High resolution coordinate outputs
 - Fast response: Coordinate report rate up to 100Hz
 - Individual sensor touch (for up to 32 touch key applications)
 - Integrated touch size output (area and strength) for touch integrity
 - Gesture recognition engine
 - Electrode mapping for optimal PCB layout
 - Configurable coordinate resolution and orientation
 - Compatible with wide range of overlay materials and thicknesses
 - Compatible with multiple 1-and 2-layer sensor patterns
 - Adjustable sensing frequency offset for limiting potential display interference
 - No calibration required - systems automatically compensated for mechanical & temperature changes
 - Water immunity features
- > Design and manufacturing support
 - Touch pattern layout drawing
 - Full FPC layout package (example & customized)
 - Test guide for touch pattern
 - RFI immunity design support
- > Design simplicity
 - PC Software for debugging and obtaining optimal performance
 - One-time settings programming(during MP) or pre-programmed devices
 - Auto-run from programmed settings for simplified integration
 - No production line calibration required
- > Display cover lens thickness
 - Minimum thickness: 0.5mm
 - Maximum thickness: 2-4mm depending on design parameters
- > Base board IC placement support
 - Up to 200mm² board to touch panel interface capability



WLCSP18 & QFN20
package
Representation only





- > Minimize display noise
 - Advanced DSP for touch performance
 - Display and charger interference avoidance
 - Auto adjusting digital filters
- > Supports different display touch panel types
 - On-cell
 - Add-on touch panel
- > Supporting up to 2.5" panels
- > Screen resolution
 - 256 per channel
 - Example: 1792x768 (8x4 channels), 1280x1024 (6x5 channels)
- > Automated system power modes for optimal response vs consumption
- > I2C communication interface with IRQ/RDY (up to fast plus -1MHz)
- > Event and streaming modes
- > Customizable user interface due to programmable memory
- > Supply Voltage 1.8V(-5%) to 3.5V
- > Small packages
 - WLCSP18 (1.62x 1.62x0.5 mm) - interleaved 0.4mm x 0.6mm ball pitch
 - QFN20 (3 x 3 x 0.5 mm) - 0.4mm pitch

1.2 Applications

- > Fitness Bands
- > True Wireless Stereo (TWS) earbuds
- > Game controller touch pads
- > Headphones

1.3 Block Diagram

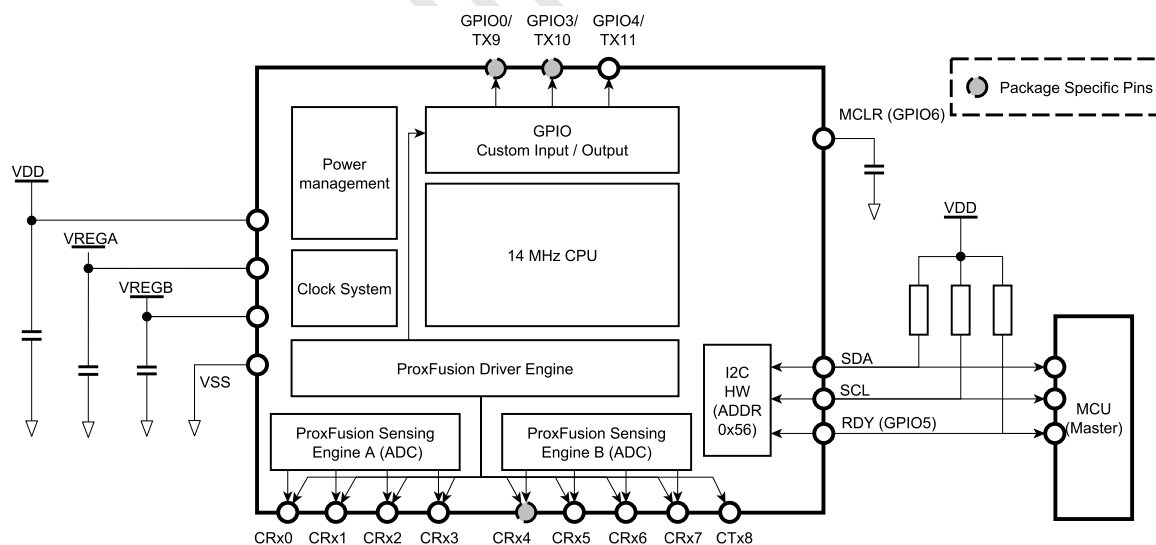


Figure 1.1: Functional Block Diagramⁱ

ⁱWLCSP18 packages do not have a CRx4 and combines GPIO0 and GPIO3



1.4 Option Summary

Table 1.1: Maximum Sensor Configurations - QFN20

	Trackpad Square	Trackpad rectangle
Trackpad option	6x5	8x4

Table 1.2: Maximum Sensor Combinations - WLCSP18

	Trackpad Square	Trackpad rectangle
Trackpad option	5x5	7x4

Preliminary



2 Hardware Connection

2.1 WLCSP18 Pin Diagrams

Table 2.1: 18-pin WLCSP18 Package (Bottom/Ball-side View)

Pin no.		Signal
A5		GPIO6 / MCLR
A3		SCL/ GPIO2
A1		Tx9/Tx10/GPIO0/GPIO3 ⁱ
B4		SDA/GPIO1
B2		Tx11/GPIO4
C5		Vdd
C3		RDY/ GPIO5
C1		Tx8
D4		Vss
D2		CRx2/Tx2
E5		VregD
E3		CRx1/Tx1
E1		CRx6/Tx6
F4		CRx0/Tx0
F2		CRx5/Tx5
G5		VregA
G3		CRx3/Tx3
G1		CRx7/Tx7

Ball-side View

Top side View

2.2 QFN20 Pin Diagram

Table 2.2: 20-pin QFN Package (Top View)

Pin no.	Signal name	Pin no.	Signal name
1	VDD	11	CRx6
2	VREGD	12	CRx7
3	VSSD & VSSA	13	CTx8
4	VREGA	14	GPIO0
5	CRx0	15	GPIO3
6	CRx1	16	GPIO4
7	CRx2	17	GPIO5
8	CRx3	18	GPIO2
9	CRx4	19	GPIO1
10	CRx5	20	GPIO6

Area name

Tab

Signal name

Float

ⁱPlease note that CTx9 and CTx10 are shorted in the WLCSP18 package



2.3 Reference Schematic

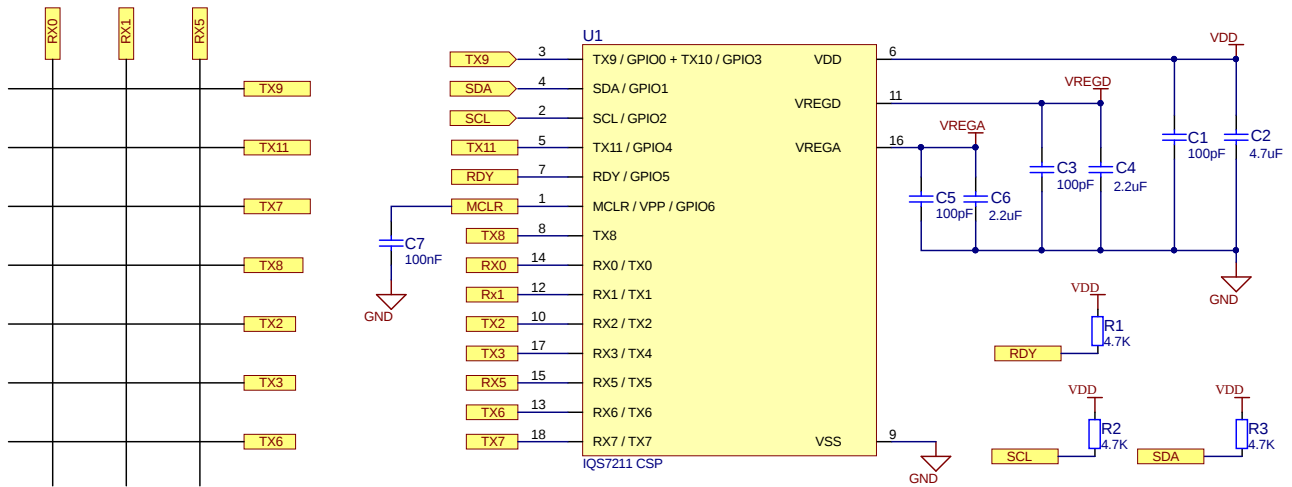


Figure 2.1: Reference Trackpad Schematic: 7x3 Pattern



3 Electrical Characteristics

3.1 Absolute Maximum Ratings

	Min	Max	Unit
Voltage applied at VDD pin to VSS	1.71	3.5	V
Voltage applied to any ProxFusion® pin	-0.3	VREG	V
Voltage applied to any other pin (referenced to VSS)	-0.3	VDD + 0.3 (3.5V max)	V
Storage temperature, T _{stg}	-40	85	°C

3.2 ESD Rating

	Value	Unit
V _(ESD) Electrostatic discharge Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁱ	± 4000	V

3.3 Recommended Operating Conditions

Recommended operating conditions		Min	Nom	Max	Unit
VDD	Supply voltage applied at VDD pin	1.71		3.5	V
VregA	Analog-domain Regulator output at VregA	1.5	1.53	1.75	V
VregD	Digital-domain Regulator output at VregD	1.57	1.59	1.8 ⁱⁱ	V
VSS	Supply voltage applied at VSS pin	0	0	0	V
T _A	Operating free-air temperature	-40	25	85	°C
C _{VDD}	Recommended capacitor at VDD	1	2	10	μF
C _{VREGA}	Recommended external buffer capacitor at VREG, ESR ≤ 200mΩ	1	2	10	μF
C _{VREGD}	Recommended external buffer capacitor at VREG, ESR ≤ 200mΩ	1	2	10	μF
C _{X_SELF-VSS}	Maximum capacitance of all external electrodes on all ProxFusion® blocks (self-capacitance mode)	-	-	400	pF
C _{m_CTX-CRX}	Capacitance of all external electrodes on all ProxFusion® blocks (mutual-cap mode)	0.1	-	90	pF
C _{X_CRX-VSS-1M}	Maximum capacitance of all external electrodes on all ProxFusion® blocks (mutual-capacitance mode @ f _{xfer} =1MHz)			100	pF
C _{X_CRX-VSS-4M}	Maximum capacitance of all external electrodes on all ProxFusion® blocks (mutual-capacitance mode @ f _{xfer} =4MHz sensing)			25	pF
$\frac{C_{X_{CRX-VSS}}}{C_{m_{CTX-CRX}}}$	Capacitance ratio for optimal SNR in mutual capacitance mode	10		20	n/a
RC _{X_CRX/CTX}	Series (in-line) resistance of all mutual capacitance pins (Tx & Rx pins) in mutual capacitance mode	0 ⁱⁱⁱ	0.47	10 ^{iv}	kΩ
RC _{X_SELF}	Series (in-line) resistance of all self capacitance pins in self capacitance mode	0 ⁱⁱ	0.47	10 ^{iv}	kΩ

ⁱ JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process. Pins listed as ±4000 V may actually have higher performance.

ⁱⁱ V_{dd} ≥ 2V

ⁱⁱⁱ Nominal series resistance of 470Ω is recommended to prevent received and emitted EMI effects. Typical resistance also adds additional ESD protection

^{iv} Series resistance limit is a function of f_{xfer} and the circuit time constant, RC. $R_{\max} \times C_{\max} = \frac{1}{(6 \times f_{xfer})}$ where "C" is the pin capacitance to Vss.



3.4 Current Consumption

Power mode	Active channels	Report rate (Sampling rate) [ms]	Current [μ A]
Active Mode	Trackpad - All (9 Channel)	10	1400
Idle	Trackpad - All (9 Channel)	50	200
Low Power 1	Wake-up touch - single	100	12
Low Power 2	Wake-up touch - single	200	5

Preliminary



4 Ordering Information

IQS7211A zzz ppb

IC NAME	IQS7211A	=	IQS7211A	
POWER-ON CONFIGURATION	zzz	=	000	I ² C with initialize settings requirement
PACKAGE TYPE	pp	=	CS	WLCSP-18 package
		=	QN	QFN-20 package
BULK PACKAGING	b	=	R	WLCSP-18 Reel (3000pcs/reel)
				QFN-20 Reel (2000pcs/reel)

Figure 4.1: Order Code Description

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5 Package Specification

5.1 Package Outline Description - WLCSP18

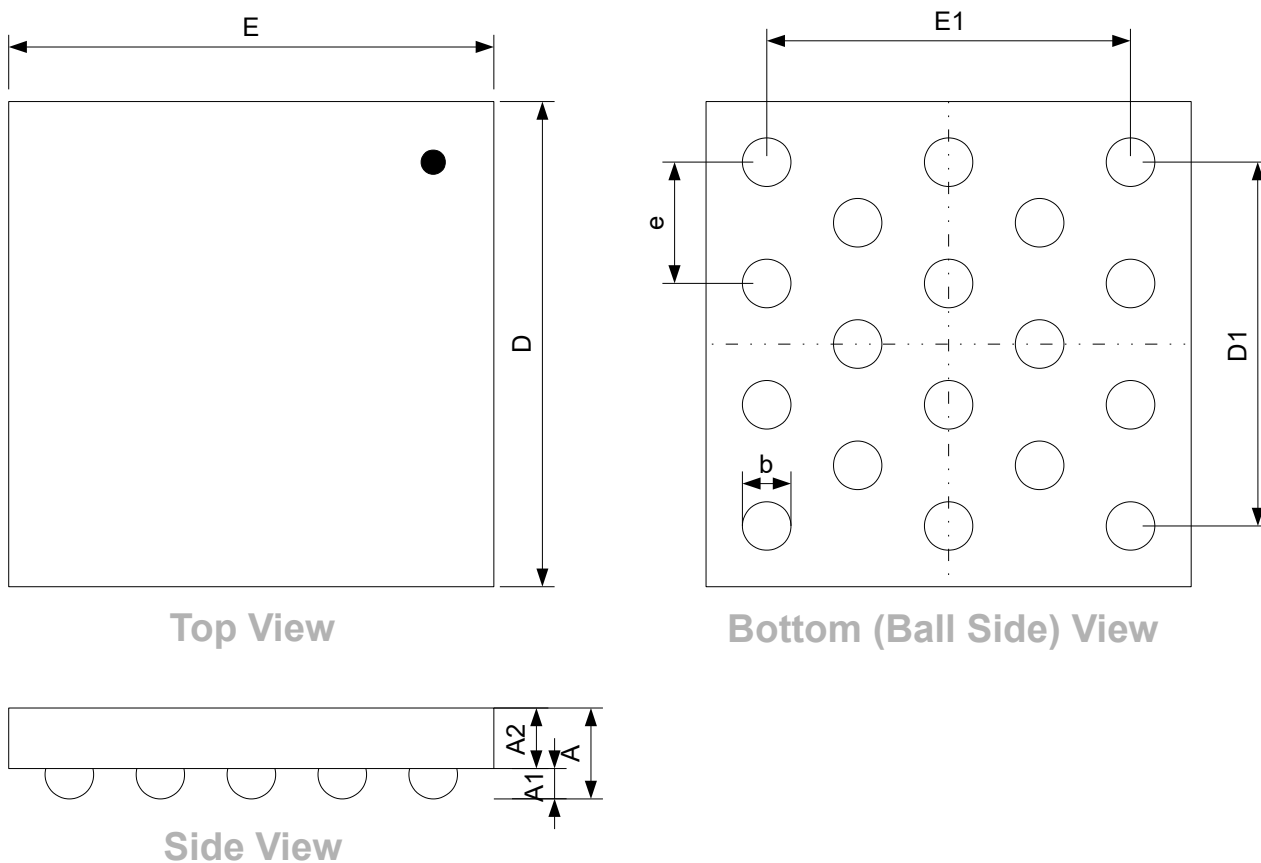


Figure 5.1: WLCSP (1.62x1.62) - 18 Package Outline Visual Description

Table 5.1: WLCSP (1.62x1.62) - 18 Package Outline Visual Description

Dimension	[mm]	Dimension	[mm]
A	0.525±0.05	D1	1.2
A1	0.2±0.02	E	1.620±0.015
A2	0.3±0.025	E1	1.2
b	0.260±0.39	e	0.4
D	1.620±0.015		

5.2 Package Outline Description - QFN20

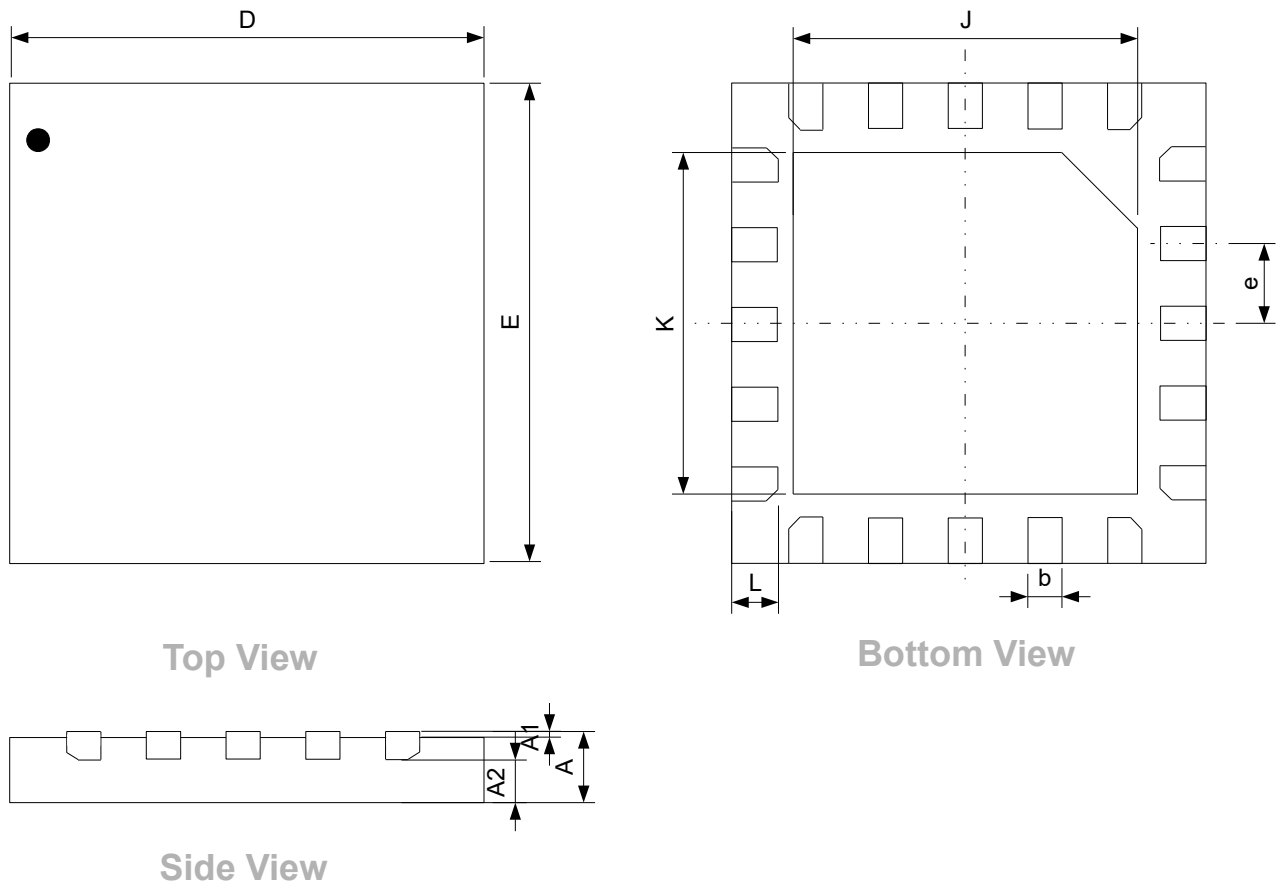


Figure 5.2: QFN (3x3)-20 Package Outline Visual Description

Table 5.2: QFN (3x3)-20 Package Outline Visual Description

Dimension	[mm]	Dimension	[mm]
A	0.5±0.1	E	3
A1	0.035±0.05	e	0.4
A2	0.3	J	1.7±0.1
A3	0.203	K	1.7±0.1
b	0.2±0.05	L	0.4±0.05
D	3		



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