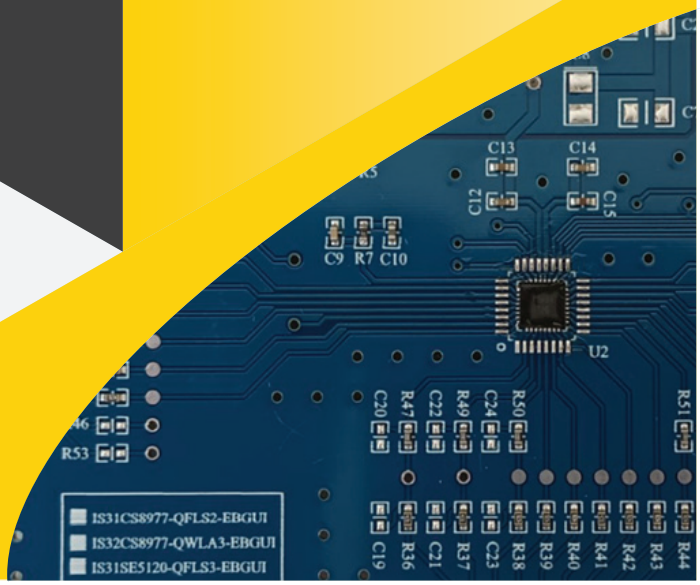
IS32SE5120A
24-Channel Capacitive Touch Controller



This article introduces the IS32SE5120A, a new capacitive touch controller. The IS32SE5120A features 24 channel input, I2C, AEC-Q100 certification, and extended industrial temperature range. The IS32SE5120A is aimed at commercial, industrial and automotive touch and sensing applications.

Capacitive touch controllers are utilized in home appliances and automotive applications. They are commonly found in home appliances such as microwave ovens, stove tops and refrigerators. Within modern automobiles, touch controllers are often used to open and close door locks, program front and rear consoles, and control roof panels.

As technology advances, touch controllers are being utilized in state-of-the-art touchless faucets. Touchless faucets use touch controllers to enable a faucet simply at the wave of a hand. How do touchless faucets work? When a person waves his hand, the break in the proximity sensors field sends a response to the touch controller which in turn triggers a hardware interrupt. Once an interrupt is acknowledged, the controller enables or disables a water relay.

Lumissil's IS32SE5120A eases design through gen 3 capacitive sensing technology allowing for detection without physical contact. This technology allows for active sensing which extends range and passive sensing. Active proximity means one electrode acts as a transmitter and a second electrode acts as a receiver. When nothing is in the zone there is a baseline capacitance measured on the receiver electrode. When a hand enters the zone, capacitance is disrupted. Although active detection gives longer range, it may draw more power than passive detection since it does not rely on transmitters. In addition, because the controller features ultra-low power sleep mode and auto-detect wakeup mode, it is suitable for power constraint applications. Figure 1 illustrates a touchless faucet.

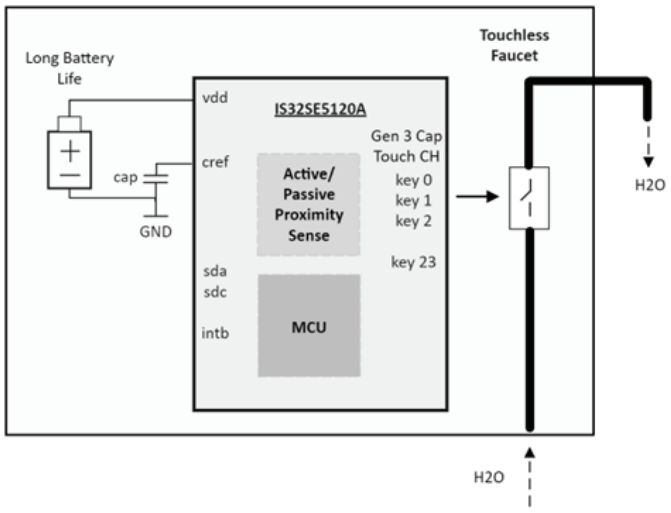


Figure 1: Touchless Faucet Utilizing the IS32SE5120A

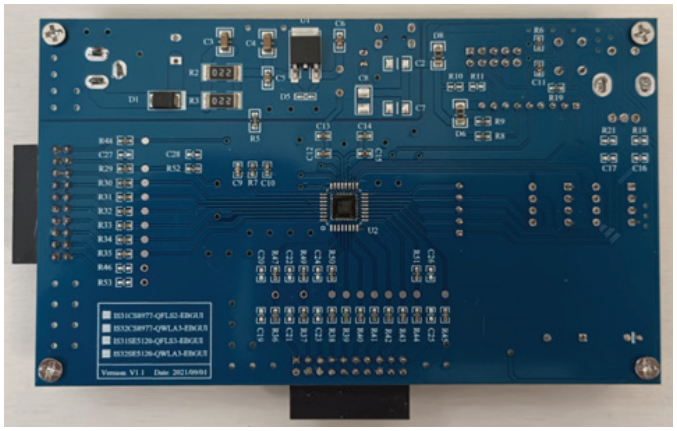
Key advantage and benefits include,

- **24 channels:** Supports multiple applications with a single device.
- **Active/Passive Proximity Gen 3 Sense:** Simplifies design, lowers BOM cost.
- **Individual key threshold and key calibration:** Supports multiple independent applications with a single device.
- **Calibration monitoring:** Prevents false triggering.
- **Ultra-low power sleep mode:** Perfect for power constraint applications.
- **Auto sleep and auto wakeup:** Perfect for power challenged applications.
- **I2C bus:** Popular bus for communication between one or more touch controllers.

Other common uses cases of the IS32SE5120A includes:

1. **Control Panel:** Programming timers, setting temperature, or controlling device's on/off.
2. **Door Locks:** Controlling the locking and unlocking mechanism of car doors.
3. **Window Controllers:** Managing the operation of power windows.
4. **Mirror Adjusters:** Handling the electronic adjustment of side mirrors.
5. **Seat Adjusters:** Controlling motorized movements of seats, particularly in non-memory seats.
6. **Interior Lighting:** Managing simple on/off and dimming functions of cabin lights.
7. **Climate Control:** Basic operations of heating, ventilation, and air conditioning systems.
8. **Rain/Light Sensors:** Simple sensors for detecting rain or ambient light levels.
9. **Steering Wheel Controls:** Interfacing with buttons for audio, phone, and other basic controls.
10. **Wiper Control:** Basic control of windshield wipers, excluding speed-sensitive or automatic functions.
11. **Small Motors Control:** Operating small motors for applications like headlamp levelers.
12. **Liquid Level Monitor:** Automate liquid levels.

Lumissil makes developing applications easy with Lumissil's hardware development kit shown in Figure 2. Microsoft VS Code software development environment also simplifies task since it includes a project manager, code editor, compiler and debugger.



IS32SE5120A Evalboard

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Lumissil offers a growing family of touch controllers with advanced capabilities that support modern systems by increasing system performance and accelerating response to system events. Below is a table of the latest generation of touch controllers.

PRE-PROGRAMMED GEN3 TOUCH KEY AND PROXIMITY CONTROLLERS

Features	SE5117A	SE5118A	SE5120A
Gen3 Cap Touch Channels	16	8	24
Active Shield Driver	✔	✔	✔
Auto Sleep/Wake on Touch	✔	✔	✔
Buzzer/Melody		✔	✔
Active Proximity Sense			✔
Passive Proximity Sense	✔	✔	✔
Automatic Self Calibration	✔	✔	✔
400kHz I2C	✔	✔	✔
Configurable GPIO	✔		✔
Per-Key Sensitivity Set	✔	✔	✔
Multi-key	✔	✔	✔
Press and Hold	✔	✔	✔
Package	QFN-24	TSSOP-16	LQFP-32
Industrial Temp Range	-40 to 85°C		
Automotive Temp Range	-40 to 125°C, -40 to 85°C		
Auto Qual	AEC-Q100 Grade 1		

Table 1: Application Specific Touch/Proximity Sensor Controller

For applications that require added features, lumissil MCU's such as the IS31CS8977 also features gen 3 sensing technology.

Part Number	CS8974	CS8975	CS8976	CS8977	CS8978	CS8979
Core	1 Cycle 8051					
Speed	16 MHz	32 MHz				
RAM	2KB	1KB	1KB	2KB	2KB	2KB
Flash	32KB ECC	16 KB ECC	16KB	64KB	64KB	64KB
GPIO	20	12	10	28	20	9
Interrupts	20	6	6	6	6	6
I2C	3	2	2	2	1	2
SPI	1	1	1	1	1	1
UART	2	2	1	2	2	2
LIN	1 Controller	1 Controller	Integrated LIN Phy + Controller	1 Controller	Integrated LIN Phy + Controller	1 Controller
Comparators	4	4	2	4	4	4
Timers	5@16b and 1@24b					
ADC	No	16 ch, 11b SAR	4 ch, 11b SAR	16, 12b SAR	16, 12b SAR	8, 12b SAR
DAC	No	1 ch, 8b				
Temp Sensor	No	Yes				
PWM	6 ch, 8b	6 ch, 12b				
Cap Touch	19 Gen 3	11 Gen 3	9 Gen 3	27 Gen 3	20 Gen 3	20 Gen 3
Melody Maker	Yes					
Integrated LED Driver	No					Yes: 16@60 mA Constant Current/ Dimmable
Package	TSSOP-24 QFN-24	TSSOP-16 SOP-8	TSSOP-20	TS-SOP-20,24,28 LQFP-32	QFN-40	QFN-40 6x6
Industrial	-40 to - 85°C					
Automotive	-40 to 125°C					
Auto Qual	AEC-Q100					

Table 2: General Purpose MCUs