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Configurable LED Matrix Driver and Touch Sensing Controller SoC

Advanced Integrated 8 x 16 LED Matrix Driver and 16 Capacitive Touch Key Controller

Enabling HMI in Industrial and Automotive Applications

MILPITAS, Calif., Oct 14, 2024 -- Lumissil Microsystems expanded its automotive and industrial 32-bit MCU portfolio with the introduction of the IS31CS9310 and IS32CS9310 family of intelligent programmable LED SoC with touch key controller. The LED driver enables the IS31CS9310 and IS32CS9310 to create LED matrix light tailored to system requirements. They feature integrated non-volatile memory to store LED parameters essential for dynamic lighting effects such as color transition, pulsing, fading and animated patterns.

Dynamic lighting effects are created by an 8 x 12 LED matrix driver using 8 PMOS switches and 12 built-in current sinks, operating without an external microcontroller, thus reducing PCB size and cost. To address potential EMI from high-frequency LED operation, these drivers feature spread spectrum frequency modulation, distributing energy across a wide range to help meet EMI compliance standards. LED ghosting or residual light is tackled with a de-ghosting circuit in the IS31CS9310 and IS32CS9310. For precise brightness control and uniform illumination, the drivers use 12-bit 80mA PWM-controlled current sinks, allowing each LED to be adjusted across 4096 brightness levels or the entire matrix across 256 levels.

To streamline the process of replacing traditional mechanical buttons, the IS31CS9310 and IS32CS9310 are equipped with a touch controller consisting of 16 capacitive touch key sensors. These touch key sensors offer water and dust resistance, ensuring reliable operation in environments prone to moisture or splashes. This makes the IS31CS9310 and IS32CS9310 suitable for applications where durability and resistance to environmental factors are critical.

In addition to touch key capabilities, the touch keys can be customized from self-capacitance to mutual capacitance, allowing the touch keys to serve as a touch sense matrix. Specifically, by reconfiguring the touch keys, it allows the keys to function as an 8-channel proximity sensor to detect gestures.

The IS31CS9310 and IS32CS9310 include a 32-bit RISC-V processor as a flexible option to x86 and ARM processors. It can be configured for low power or high performance, leveraging a reduced instruction set architecture to efficiently decode and execute instructions, reducing power demand. The processor's pipeline depth and execution types (integer, floating-point, branch prediction) are configurable. For power constraints, fewer pipeline stages can save power; more stages boost performance. It also features dynamic voltage and frequency scaling to optimize energy use. Being open source, RISC reduces risk and accelerates time to market with access to shared tools and resources.

In addition to the RISC architecture, the IS31CS9310 and IS32CS9310 feature 256KB of integrated non-volatile memory to store not only custom LED patterns but also custom firmware for HMI white goods home appliances, automotive dashboard applications, and Industrial

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control panel use cases. The on-board memory simplifies design and minimizes BOM cost by eliminating the need for external memory and hardware. It also supports more advanced features such as melody generator, OTA (over the air) update capability and debugging port/tool support. "Lumissil is ready to tackle the next challenge integrating LED Drivers and touch sensing microcontrollers, addressing smart homes, appliances, automotive dashboards, industrial automation, and medical equipment with the new IS31CS9310 and IS32CS9310 32-bit MCU SoC," said Ven Shen, Lumissil's VP of Marketing. "The IS31CS9310 and IS32CS9310 will aid the development of advanced applications requiring integrated lighting and HMI sensing."

Availability and Pricing

The IS31CS9310 and IS32CS9310 are available in mass production quantities. The industrial/commercial IS31CS9310 is offered in an eLQFP-64 package, priced at $1.79 in 1k quantities. The automotive IS32CS9310 is AEC-Q100 qualified and comes in an eLQFP-64 package, priced at $1.99 in 1k quantities.

About Lumissil Microsystems

Lumissil Microsystems specializing in analog/mixed-signal products for automotive, communications, industrial, and consumer markets. Lumissil's primary products are LED drivers for low to mid-power RGB color mixing and high-power lighting applications. Other products include audio, sensors, high-speed wire communications, optical networking, and application specific microcontrollers. Lumissil Microsystems has worldwide offices in the US, Taiwan, Japan, Singapore, mainland China, Europe, Hong Kong, India, and Korea. Website: https://www.lumissil.com

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