



PCA9959, 24-CHANNEL SPI SERIAL BUS, 63 MA, 5.5 V CONSTANT-CURRENT LED DRIVER



Constant-current LED driver optimized for status LED color mixing applications in small form factor package

- 24-ch. LED controller optimized for 5 V single LED applications
 - Lower price—5 V and 63 mA optimized die size for single LED
 - Smaller footprint—space-saving 0.4 mm pitch 5 x 5 mm QFN package
- Allows easy control of RGB status and fun lights
- Samples and demo board readily available from NXP

NXP's PCA9959 is a daisy-chain SPI-compatible 4-wire serial-bus-controlled 24-channel constant-current LED driver optimized for dimming and blinking 63 mA Red/Green/Blue/Amber (RGBA) LEDs. Each LED output has its own 6-bit resolution (64 steps) preset current configuration with an absolute accuracy of $\pm 8\%$.

The PCA9959 serial bus supports up to four groups of LED gradation control, with each LED channel assigned to one of the groups. For each group, the PCA9959 serial bus supports 64-grid brightness control with the time duration of each grid adjustable from 2.5 μs to 1 ms. Each LED output can be off, on or set at its individual preset current value within each grid. Once gradation control is enabled, the PCA9959 serial bus will automatically change each LED preset current with the setup from grid0 to grid63. Once finished, it can hold at grid63 or repeat from grid0 as configured.

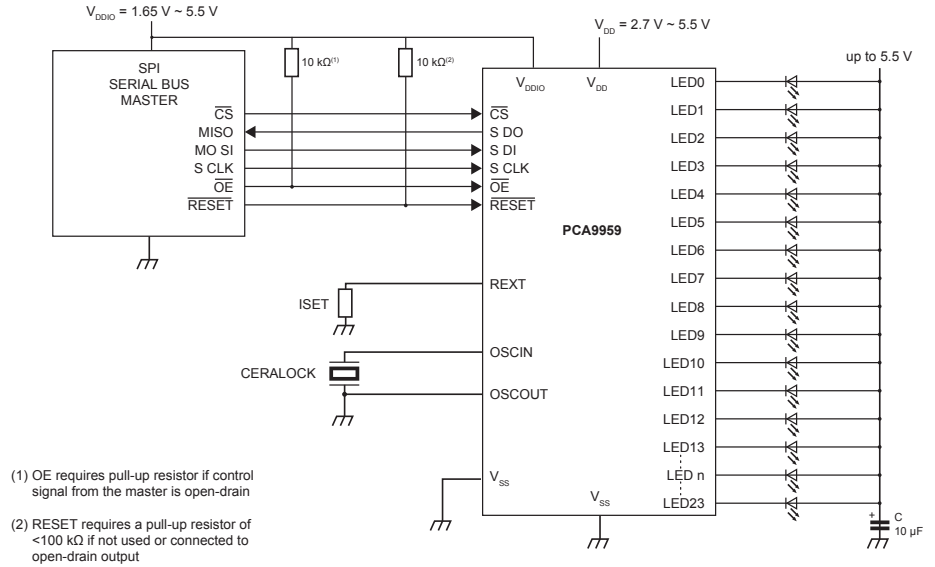
The PCA9959 serial bus operates with a supply voltage range of 2.7 V to 5.5 V and the constant-current sink LED outputs allow up to 5 V for the LED supply. The output peak current is adjustable with an 8-bit linear DAC from 1 mA to 63 mA with $\text{REXT} = 1 \text{ k}\Omega$.

This PCA9959 serial bus also has built-in open, short load and overtemperature detection circuitry. The error information from the corresponding register can be read via the 4-wire serial bus. Additionally, a thermal shutdown feature protects the device when the internal junction temperature exceeds the limit allowed for the process.

PRIMARY APPLICATIONS

- RGB or RGBA LED drivers
- LED status information
- LED displays
- LCD backlights
- Smart speakers
- VR headsets
- Portable displays
- Portable fun lighting
- Keypad backlights for cellular phones or handheld devices
- Fade-in and fade-out for breathlight control

TYPICAL APPLICATION DESIGN-IN



KEY FEATURES

- Maximum output current 63 mA/channel
- Down to 0.4 V (min) voltage drop at LED outputs
- Absolute accuracy $\pm 5\%$ (max) between channels
- 40-pin 5 mm x 5 mm QFN package saves space
- 140° C overtemperature protection
- 10 MHz SPI controlled 24-channel constant-current LED
- 64-step preset current for each LED channel during gradation control
- IREFx registers to set current gain
- 2.7 V to 5.5 V supply range; V_{DDIO} down to 1.8 V
- No glitch on LEDn outputs on power-up

https://www.nxp.com/products/power-management/lighting-driver-and-controller-ics/ic-led-controllers:MC_48878

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