



PCA9957,
24-channel SPI serial
bus, 32 mA, 5.5 V
constant current
LED driver

Build a better full-color RGB status or fun light display

This flexible SPI LED controller is optimized for full-color RGB status and fun light displays with 256 step adjustments for both current and PWM dimming along with gradation control and programmable output delay to reduce EMI and surge currents.

OVERVIEW

NXP's PCA9957 is a daisy-chain SPI-compatible 4-wire serial bus controlled 24-channel constant current LED driver optimized for dimming and blinking 32 mA Red/Green/Blue/Amber (RGBA) LEDs.

Each LED output has its own 8-bit resolution (256 steps) fixed frequency individual PWM controller that operates at 31.25 kHz with a duty cycle that is adjustable from 0 % to 100 % to allow the LED to be set to a specific brightness value. An additional 8-bit resolution (256 steps) group PWM controller has both a fixed frequency of 122 Hz and an adjustable frequency between 15 Hz to once every 16.8 seconds with a duty cycle that is adjustable from 0 % to 99.6 % that is used to either dim or blink all LEDs with the same value.

Each LED output can be off, on (no PWM control), set at its individual PWM controller value or at both individual and group PWM controller values. The PCA9957 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 125 μ A to 31.875 mA with $R_{EXT} = 2 \text{ k}\Omega$.

DIFFERENTIATION

- ▶ 24-ch. LED controller optimized for 5V single LED applications
 - Optimized die size for single 5V and 32 mA LED
 - Smaller footprint – space saving 0.4 mm pitch 5 x 5 mm QFN package
 - Easy program porting - Similar control features as other NXP LED controllers
 - Down to 0.4V (min) voltage drop at LED outputs
 - Programmable LED output delay to reduce EMI and surge currents
 - Gradation control for all channels
- ▶ Allows easy control of RGB status and fun lights
- ▶ Samples and demo board readily available from NXP



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

KEY FEATURES

- ▶ Maximum output current 32 mA/channel
- ▶ Down to 0.4 V (min) voltage drop at LED outputs
- ▶ Absolute accuracy $\pm 4\%$ (max) between channels
- ▶ 40-pin 5 mm x 5 mm QFN package saves space
- ▶ 140° C over-temperature protection
- ▶ 10 MHz SPI controlled 24-channel constant current LED
- ▶ 256-step group brightness and blinking control from 0 % to 99.6 %
- ▶ IREFx registers to set current gain
- ▶ 2.7 V to 5.5 V supply range; V_{DDIO} down to 1.8 V

TYPICAL APPLICATION DESIGN-IN

