IS31FL3748

24 × 4 DOTS MATRIX LED DRIVER

Preliminary Information
October 2019

GENERAL DESCRIPTION

IS31FL3748 is an LED driver with 24 high voltage (28V) constant current channels. It can support from one to four power scan to become a 24x n matrix LED driver, where n = 1 to 4. Each channel/dot can be pulse width modulated (PWM) with 7-bit/8-bit precision for smooth LED brightness control. In addition, each channel/dot can be controlled by a 7-bit/8-bit output current control register, which allows fine tuning the current for rich RGB color mixing, e.g., a pure white color LED application. The maximum output current of each channel is designed to be 40mA, which can be adjusted by 3 7-bit/8-bit global control registers (one group for R for channels 3xI, one group for G for channels 3xI+1, and one group for B for channels 3xI+2, where I =0 to 7). Proprietary algorithms are used in IS31FL3748 to minimize power bus noise caused by passive components on the power bus such as MLCC decoupling capacitor. All registers can be programmed via HSB (high speed Series Bus, up to 10MHz), DSB (Manchester encoded, daisy chained serial bus, up to 2MHz), I2C(1MHz) or SPI (12MHz) bus.

IS31FL3748 can be turned off with minimum current consumption by either pulling the SDB pin low or by using the software shutdown feature. It internally generates 4.8V V_{OUT} to power the internal logic operation, which can also be external powered from 3V to 5.5V.

IS31FL3748 is available in QFN48 6x6 package and can work over temperature range from -40°C to +125°C.

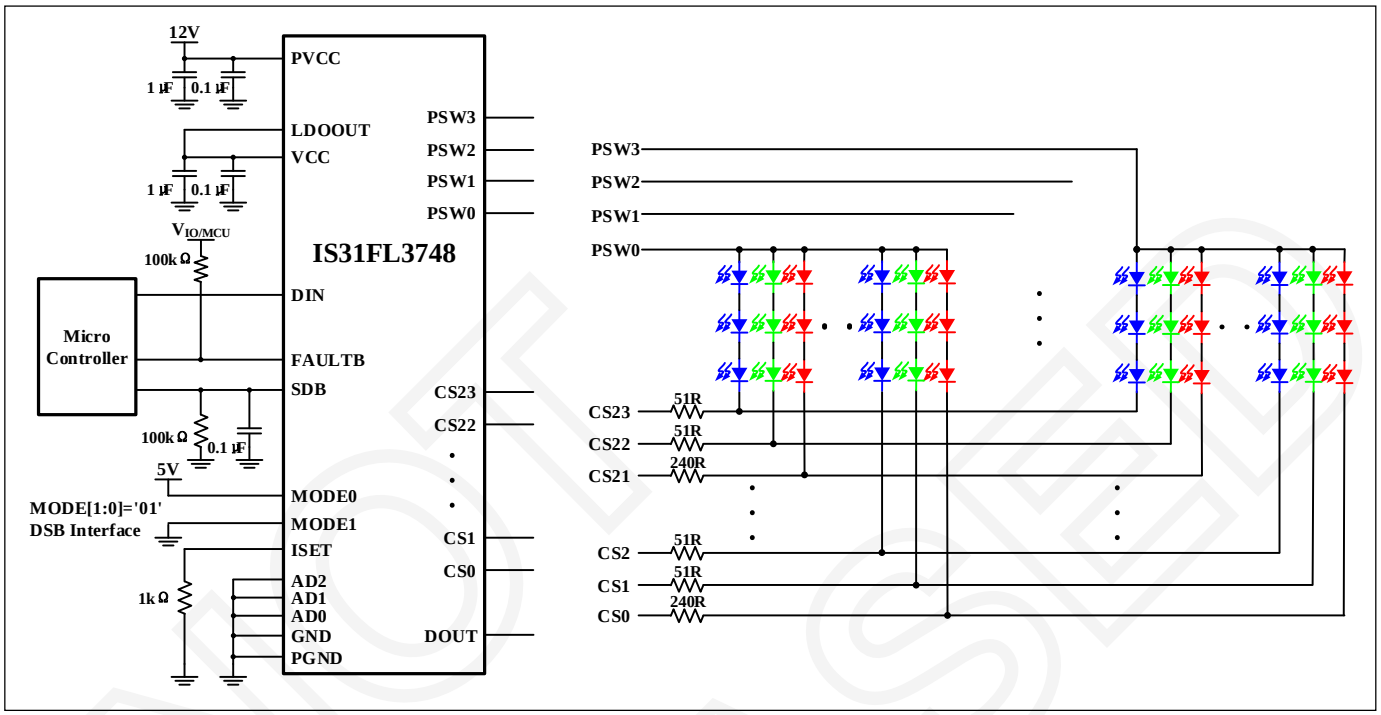
FEATURES

- Support 24 constant current channels @ 40mA/ch
- 4 PMOS high side switches (500ma, .5 ohm each); when combining 2 for 2*24 configuration, supporting 1A each
- Tolerate up to 30V, nominal operation voltage between 4.5V to 28V
- Built-in LDO to generate 4.8V supply for internal logic (option to float it and use external power)
- Interface
  - DSB (Daisy Chained Serial Bus, 2MHz)
  - HSB (High speed Series Bus: 10MHz)
  - I2C (1Mhz)
  - SPI (12Mhz)
- SDB pin rising edge reset the interface
- Reset register reset all the registers to default value
- For DSB and HSB
  - Built-in PWM generator: 7-bit/dot
  - Built-in Dot correction: 7-bit/dot
  - 7bit x 3 global current adjustment
- For I2C and SPI
  - Built-in PWM generator: 8-bit/dot
  - Built-in Dot correction: 8-bit/dot
  - 8-bit x 3 global current adjustment
- 4 groups delay to minimize the power ripple
- Channel to channel timing skew (one sys-clock skew to reduce transient noise)
- Power noise reduction method
- Spread spectrum
- LED open/short detection and fault reporting (For I2C and SPI only)
- Other protection: over temperature, over voltage, under voltage
- FAULT/bidirectional: one fail, all fail optional supported (can be turned on/off by interface bus)
- Operating temperature: -40°C to 125°C
- QFN-48 (6mm×6mm) package

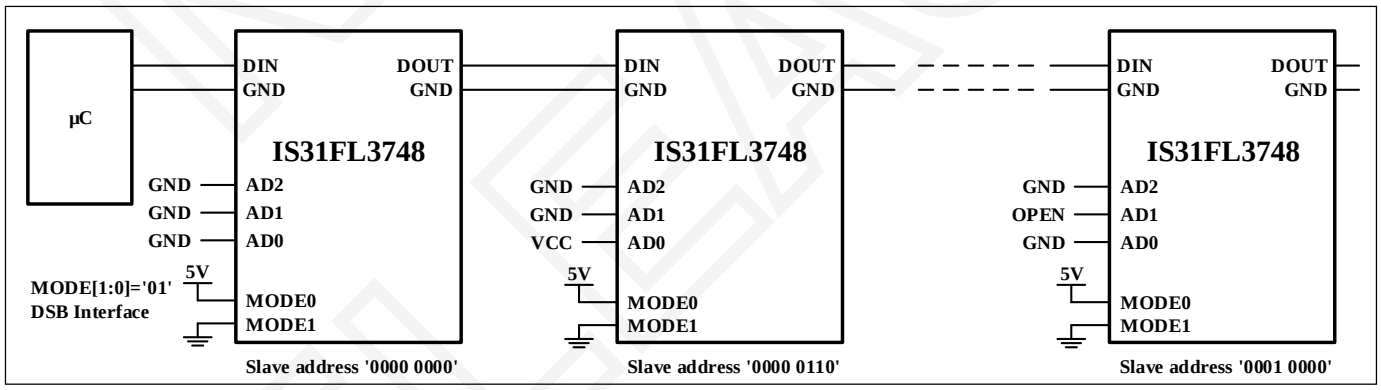
APPLICATIONS

- White Good Display Panel
- Pachinko or Gaming Machine

TYPICAL APPLICATION CIRCUIT



- **Figure 1** Typical Application Circuit, DSB interface: 24 Strings x 4 (average current in each string: 40mA/4 = 10mA)



- **Figure 2** DSB cascade connection

TYPICAL APPLICATION CIRCUIT (CONTINUED)

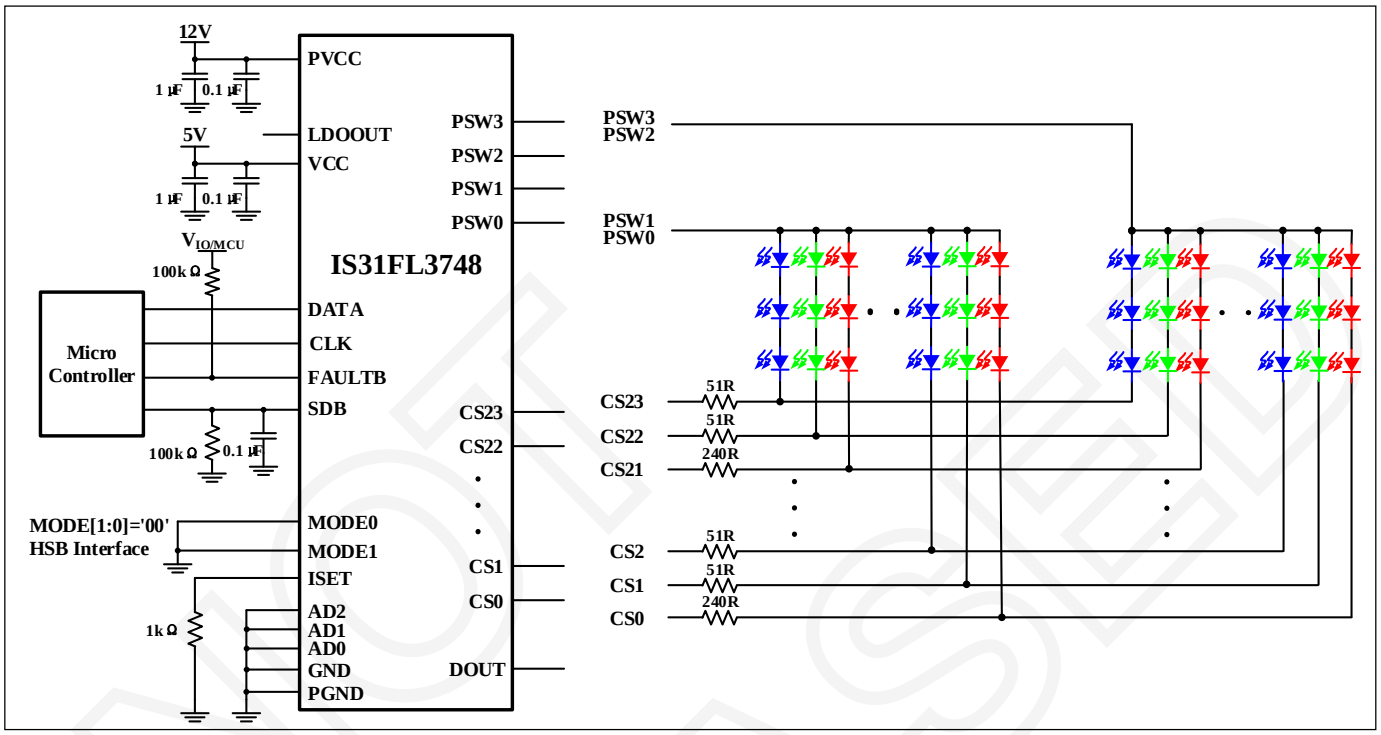


Figure 3 Typical Application Circuit, HSB interface: 24 Strings x 2 (average current in each string: 40mA/2 = 20mA)

TYPICAL APPLICATION CIRCUIT (CONTINUED)

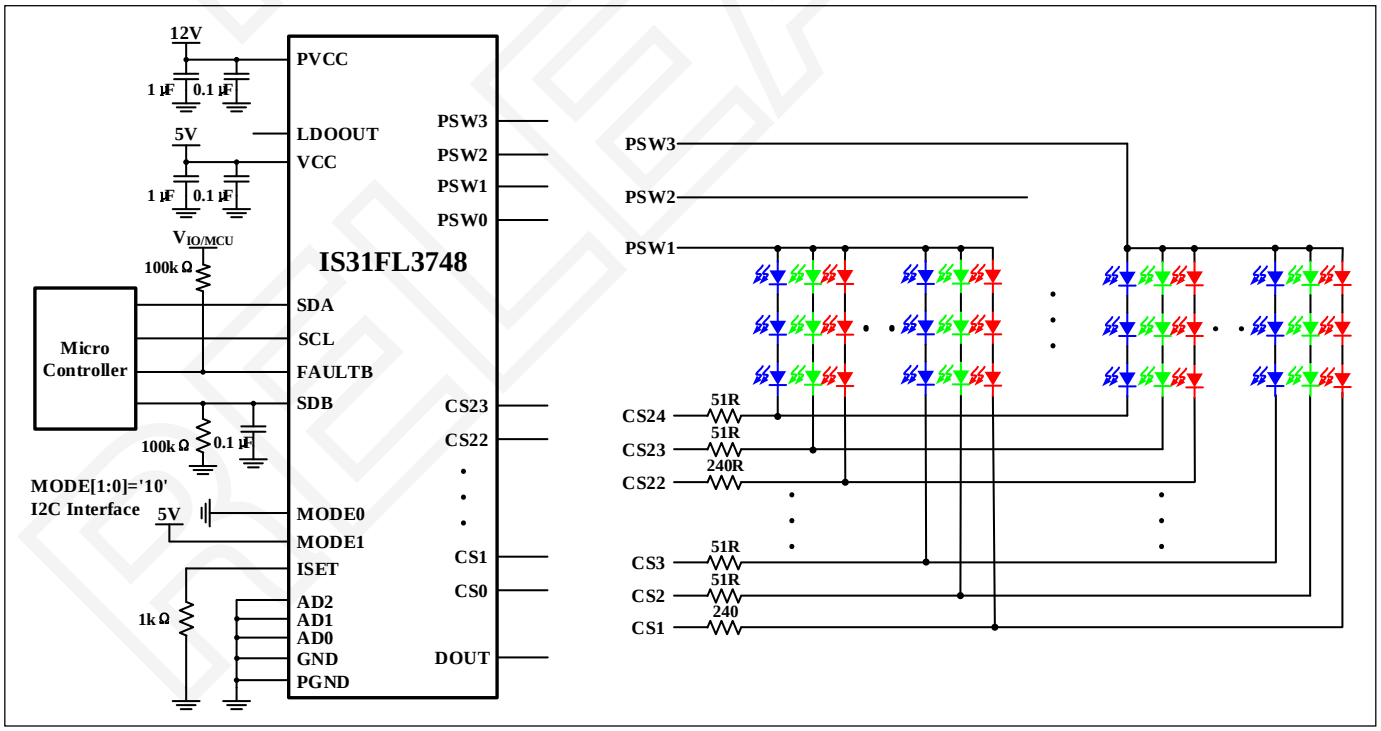


Figure 4 Typical Application Circuit, I2C interface: 24 Strings x 3(average current in each string: 40mA/3 = 13.3mA)

TYPICAL APPLICATION CIRCUIT (CONTINUED)

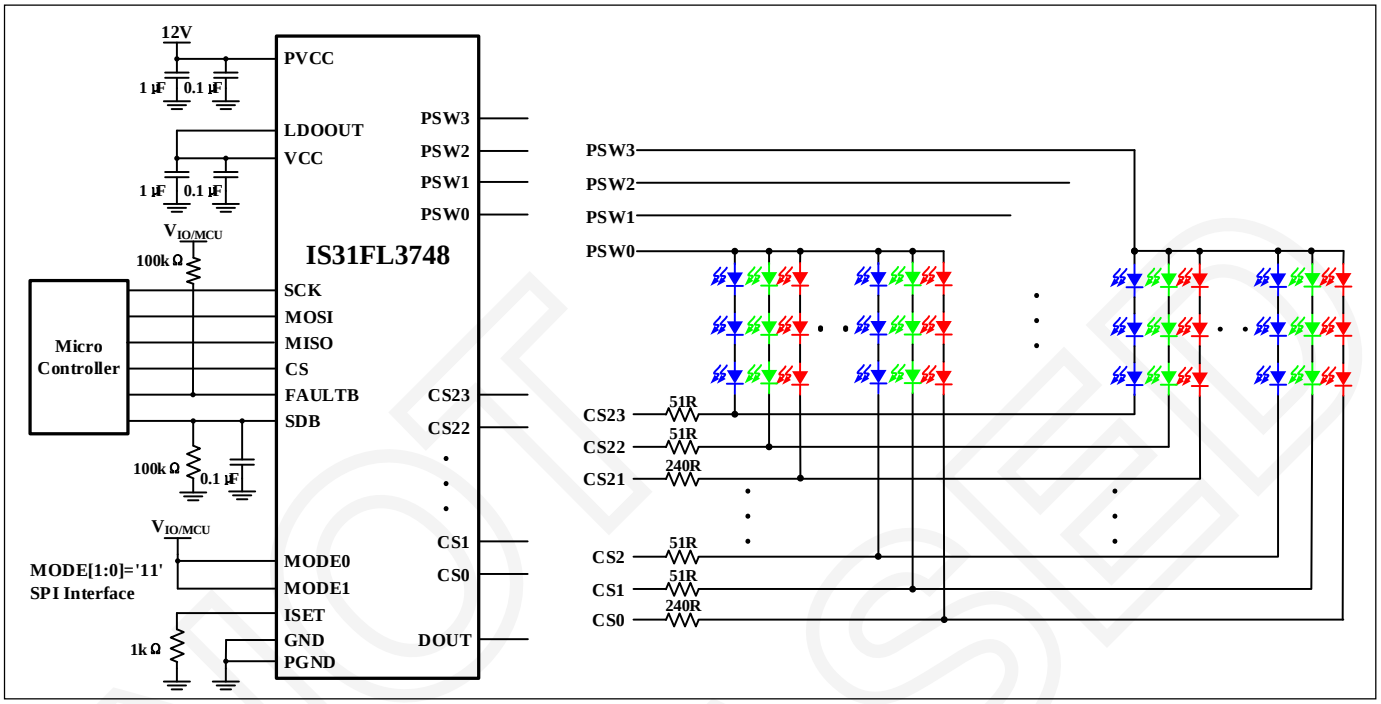


Figure 5 Typical Application Circuit, SPI interface: 24 Strings x 4 (average current in each string: 40mA/4 = 10mA)

TYPICAL APPLICATION CIRCUIT (CONTINUED)

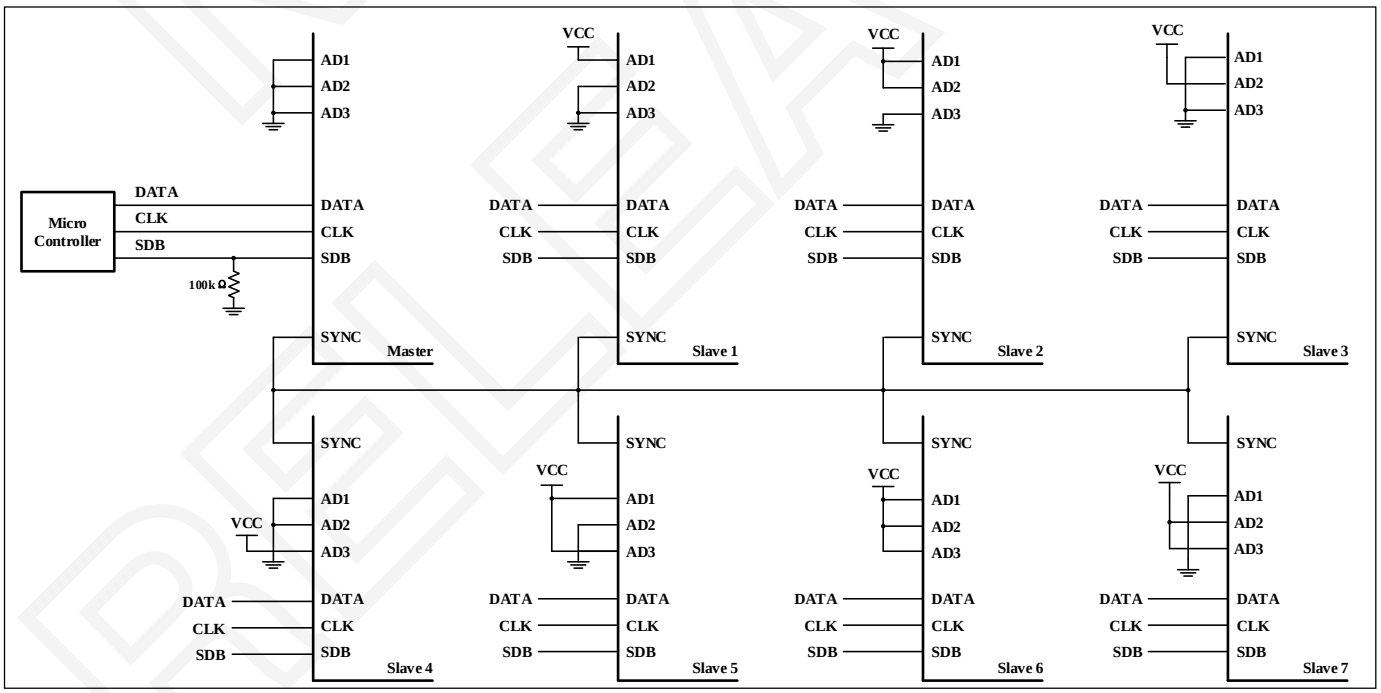


Figure 6 Typical Application Circuit: More than one slave in system

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