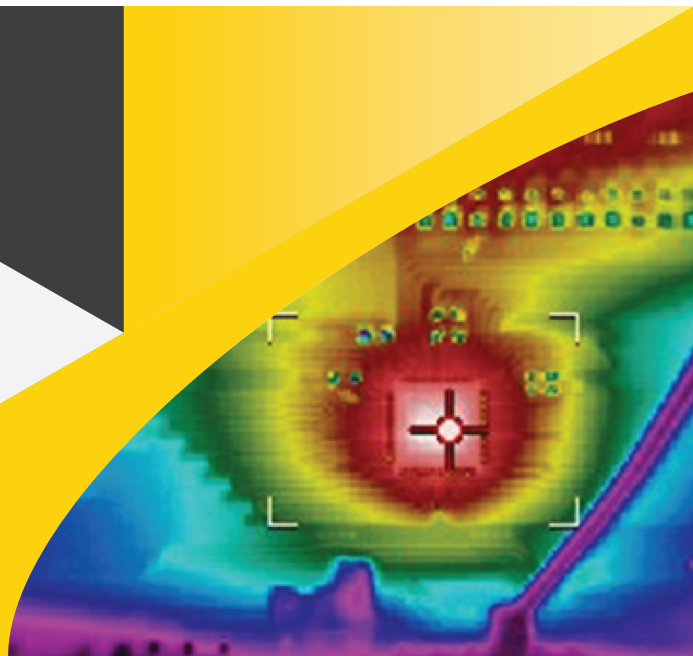




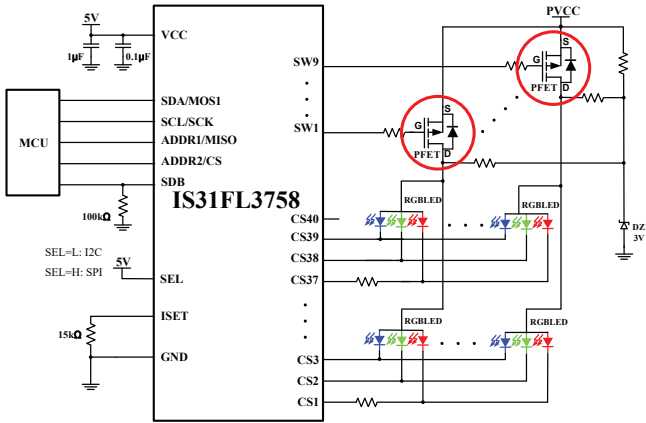


Figure 3a: IS31FL3758 Example Application Circuit

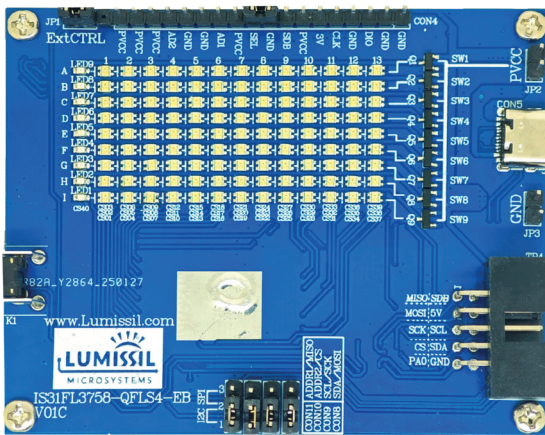


Figure 3b: IS31FL3758 Evaluation Board

The IS31FL3776 is similar to the IS31FL3758 but is designed for automotive applications and supports a configurable matrix of up to 36x6, consisting of 36 constant current sinks (CS_x) and 6 gate drivers (SW_y) for external PMOS FETs. Additional features include selectable SPI or UART bus interface and a DC/DC feedback control to adjust the voltage regulator output.

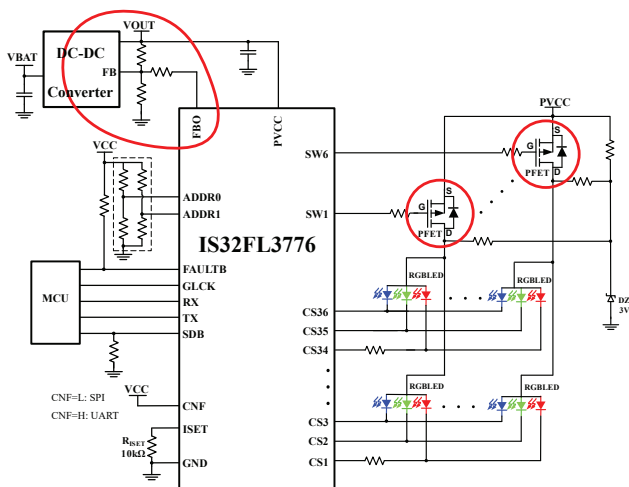


Figure 4: IS32FL3776 Example Application Circuit

The IS32FL3776 has the added capability to dynamically adjust a DC-DC converter's output voltage to maintain a minimum V_{SINK}

level on the CS_x rows. It has a built-in ADC module that can read and monitor the internal IC package temperature, V_{SINK} and PVCC voltages. This information is provided to the MCU so it can drive the IS32FL3776's FBO pin to inject a small current into the DC-DC converter's feedback network as shown in Figure 4. This effectively alters the resistor network's feedback gain (V_{FB}/V_{OUT}) resulting in an adjusted VOUT. This capability of adjusting the voltage output on the fly is useful for minimizing the row $V_{SINK} * I_{SINK}$ thermals of the matrix driver.

The automotive grade IS32FL3766 is currently in development, with target production released date of March 2026.

WHICH IS BETTER: INTEGRATED OR EXTERNAL FETs?

Lumissil offers an extensive range of matrix LED drivers, many of which feature integrated FETs. With the introduction of the consumer/industrial IS31FL3758 and the upcoming automotive IS32FL3776, designers can now choose between matrix drivers with integrated or external FET switches. The decision of which to use depends on two factors; thermal management and LED current requirements. Matrix drivers with integrated FET switches provide a compact PCB solution with fewer external components, making them ideal for applications with moderate current needs. However, integrating FETs within the IC package can lead to heat buildup inside the device, which presents thermal challenges, especially in high-current applications.

For example, Figure 5 below shows three thermal images of matrix LED drivers. The first is the IS31FL3741A (integrated FETs) configured for same matrix size and current (1.36A) as the IS31FL3758 (external FETs). Notice the IS31FL3758 with external FETs has a much lower thermal footprint. The last figure is the IS31FL3758 configured to draw 2.14A. Even with 800mA more current, the IS31FL3758 package temperature remains similar to the IS31FL3741A with a lower 1.36A. The IS31FL3758 with external FETs enables use of higher current LEDs.

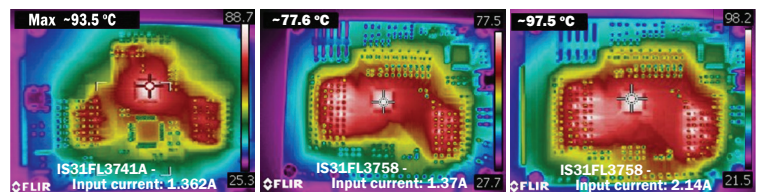


Figure 5: Thermal images with integrated FETs and external FETs

For high-power, high-current, or thermally demanding applications, matrix drivers with external FET switches, such as the IS31FL3758 or IS32FL3776, are recommended due to their ability to significantly improve thermal performance. These latest matrix driver solutions address thermal issues by allowing the use of external FETs with lower on-resistance ($R_{DS(ON)}$), which reduces conduction losses and improves overall system efficiency. Besides offloading heat away from the IC package, external FETs enable better thermal management because heat is dissipated over a larger PCB area which can be more effectively managed with increased copper pour. The soon to be released automotive grade IS32FL3776 has an added capability to dynamically adjust a DC-DC converter output voltage for additional thermal management of the integrated current sinks.