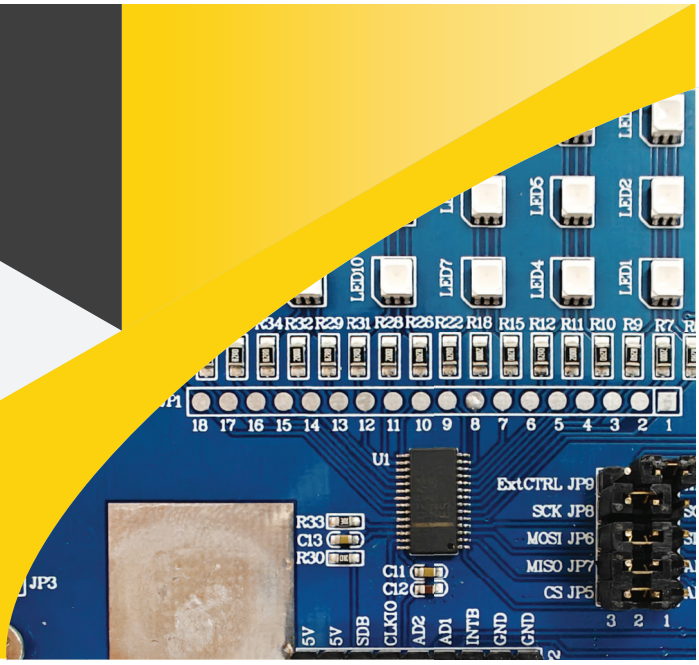
9 and 18-Channel LED Driver Choices



Lumissil Microsystems provides a wide selection of LED drivers designed to meet the requirements of various lighting projects. This article will focus on the 9-channel (9ch) and 18-channel (18ch) LED drivers and cover how lighting designers and engineers can select the appropriate LED driver for their projects. Key consideration factors are LED current, dimming, color accuracy, and EMI reduction capabilities. Additionally, this article will delve into the technical features of these 9 and 18-channel drivers.

LED CURRENT

Understanding the LED current requirements for your project is the first selection factor since the current determines the brightness of the LEDs. Lumissil drivers are designed for a maximum channel current, and the current can be set by connecting a single resistor (RISET) to the ground. Changing this resistor to different values allows designers to adjust the output current. Additionally, there are other methods to set the output current, such as modifying the respective current setting register in the LED driver. In newer drivers like the IS31FL3299 and IS31FL3099, the output current can only be adjusted through registers. It is also possible to adjust the current globally using a global current adjust and individually using PWM signals, enabling designers to achieve the desired LED brightness for their projects.

NUMBER OF CHANNELS

When defining the LED lighting requirements, it is necessary to determine the number of channels required to drive the LED's. For instance, if the design requires 7 LEDs (1 LED per channel), it is necessary to select an LED driver with more channels, because LED drivers come with a pre-defined channel count. For example, the IS31FL3299 can address the 7 LEDs; the unused channels can be left unconnected. Using an 18-channel driver like the IS31FL3218 for this application is impractical as it would result in too many unused channels and higher costs. Therefore, choosing the appropriate driver based on your LED requirements can save costs. Lumissil offers LED drivers supporting various channel outputs to accommodate different design requirements.

DIMMING

Once the output current is set either through the (RISET) resistor or via device registers, the maximum output current for the channels remains constant. If the project requires LED dimming, such as adjusting the brightness from 100% to 10%, the LED drivers must include dimming features. Features such as PWM dimming and analog dimming can be controlled through an MCU connected to the LED driver via a communication interface like I2C or SPI to achieve either individual or global dimming. Both PWM and analog dimming are used to control LED brightness; PWM adjusts the duty cycle of the current supplied to the LEDs, while analog dimming varies the current amplitude, enabling precise brightness control without affecting color quality. By combining PWM and analog dimming, it is possible to achieve very accurate LED dimming capabilities.

COLOR CORRECTION

Lumissil LED drivers offer enhanced color correction through several features. The global current adjust function allows for simultaneous current adjustment across all channels. Individual adjusting of each LED channel current will provide accurate color mixing and brightness adjustment levels of the Red, Green, and Blue LEDs ensuring precise color reproduction.

EMI REDUCTION

Spread spectrum and slew rate control are important features for EMI reduction. Slew rate control moderates the rise and fall times of the LED current, reducing power supply transient noise and preserving signal integrity. Spread spectrum technology disperses the spectrum of electromagnetic emissions, lowering peak noise levels. The latest LED drivers have an integrated PWM engine that can switch at high frequencies. Applications using multilayer ceramic capacitors (MLCCs) can generate audible noise while filtering high-frequency switching noise. MLCCs undergo the "piezoelectric effect," flexing as they smooth out

the switching noise. This flexing causes mechanical vibrations in the PCB due to the expansion and contraction of the MLCCs. This issue is effectively addressed with phase delay features. By adjusting the phase delay of the PWM signals, these drivers minimize the synchronization of switching events, reducing overall noise.

In conclusion, understanding the technical specifications and selecting the appropriate LED driver by carefully considering factors such as LED current requirements, the number of channels, dimming capabilities, color correction, and EMI reduction features, allows designers to make informed choices that align with their design specifications. Lumissil's LED drivers for industrial [IS31] and automotive [IS32] lighting applications offer performance and configurability. With a wide portfolio of LED drivers, Lumissil can meet the specific requirements of any customer and application. The table below lists Lumissil's 9ch and 18ch LED driver parts, providing a quick reference to their features. For more information or assistance in selecting the right LED driver for your application, please contact us at marketing@lumissil.com.

9 AND 18-CHANNEL LED DRIVER SELECTION

Part No	No Of Channel	IOUT max (mA)/CH	Dimming	EMI	Special Feature	Technology Generation	Comparison	Package	Recommendation
IS31FL3099	9	40	23kHz PWM frequency (8+4-bit PWM mode)	Spread Spectrum	4 patterns for auto breath	Gen 3	Similar to IS31FL3299	QFN-20	For high-volume Applications
IS31FL3199	9	40	8-bit PWM, Auto Dimming		Audio mode with AGC function	Gen 1		QFN-20	Promote IS31FL3299
IS31FL3298	9	20	7-bit global current selections (128 levels, 0mA~20mA), Each LED has up to 12-bit programmable PWM levels		Charge pump, Fade Engine	Gen 2 Charge Pump	Similar to LP5569	WLCSP-25, QFN-24	
IS31FL3299	9	40	23kHz PWM frequency (8+4-bit PWM mode) 12-bit/8+4-bit PWM/channel, 8-bit dot correction, 6-bit global current adjustment		RGB Group Fade Engine, Ultra-low Power	Gen 3	Similar to IS31FL3099	QFN-20, SOP-20	Replaces IS31FL3199
*IS31FL3207	18	38	62kHz PWM frequency (16-bit PWM), Selectable 8-bit/10-bit/12-bit/16-bit PWM, 8-bit dot correction, 8-bit global current adjustment	3 Group phase delay, Spread Spectrum		Gen 2	Same Pinout as IS31FL3208A	QFN-28 (IS31), WFQFN-28 (IS32)	
IS31FL3208A	18	38	Selectable PWM frequency (23/3.45kHz) 8-bit			Gen 1	Similar to IS31FL3207	QFN-28	Promote IS31FL3207
*IS31FL3209	18	76	Selectable PWM frequency (23/3.45kHz) 8-bit			Gen 1		QFN-28, eTSSOP-28 (IS31), WFQFN-28 (IS32)	Promote *IS31FL3238
IS31FL3218	18	38	8-Bit PWM			Gen 0	Similar to IS31FL3208A but different Pinout	QFN-24, SOP-24	Promote IS31FL3258
*IS31FL3238	18	78	62kHz PWM frequency (8-bit PWM), Selectable 16-bit PWM 256/1024/4096/65536, 8-bit dot correction, 8-bit global current adjustment	Spread spectrum, Selectable 6 phase delay, 180-degree phase delay		Gen 2		QFN-28 (IS31), e-TSSOP-28 (IS32)	
IS31FL3018	18	25	8-bit PWM at 128KHz, 10+4-bit PWM at 32kHz	Spread spectrum, Selectable 6 phase delay, 180-degree phase delay	R, G, B Channel Grouping, Drop-In for LP5018	Gen 3	Similar to IS31FL3258, Drop-In for LP5018	QFN-32	
IS31FL3258	18	25	8-bit PWM at 128KHz, 10+4-bit PWM at 32kHz	Spread spectrum, Selectable 6 phase delay, 180-degree phase delay	R, G, B Channel Grouping	Gen 3	Similar to IS31FL3018	QFN-28	
*IS31FL3265A/B	18	60	Selectable PWM method (200Hz or 25kHz), 32 steps Global current adjust, 8-bit Dot correction for each channel, 8-bit PWM for each channel	Spread spectrum, Selectable 9 phase delay	I/O tolerance voltage 40V, I2C (A), SPI (B)	Gen 1		eTSSOP-28	
IS32LT3138	18	100	12-bit PWM duty cycle setting, 7+5-bit at 24kHz, 12-bit at 244Hz, 8-bit at 24kHz, Individual 7-bit DC current adjustment, 6-bit global current setting	Slew rate control and spread spectrum	Maximum output voltage 16V	Gen 1		WFQFN-32	
IS32LT3138A	18	100	16-bit PWM duty cycle setting, 16-bit, 14+2-bit, 13+3-bit, 8+8-bit, 8-bit, DC Binning support, 6-bit global current setting	Slew rate control, spread spectrum, and PWM phase delay	Maximum output voltage 16V	Gen 2		WFQFN-32	For applications requiring safety up to ASIL-B

***Note:** The following parts are also available in [IS32] automotive version