New & Advanced Next Generation 16V 24×4 Matrix 16 bits High Resolution PWM LED Driver IS32FL3749

IS32FL3749 is a new and advanced high voltage 16V, 24×4 matrix 60mA constant current LED driver that can control LED on-time with pulse width modulation (PWM) in 65,536 steps for grayscale control. A maximum of 281 trillion colors can be generated with red, green, and blue LEDs connected to the constant current outputs for backlighting with high contrast ratios, daisy chain connection via 33MHZ SPI/VSB interface for Mini LED backlight, Automotive LED Back Light, Automotive Center Information Display, Automotive Signage and LED Video Displays applications.

Each channel has 16-bit PWM brightness control, and 256 steps of constant-current scaling (SL). SL can adjust brightness deviation between channels. Global current control (GCC) can adjusts brightness deviation between the R, G, and B color groups. (Please refer to Fig.1). IS32FL3749 chain topology via SPI/VSB interface, PWM data I/O is daisy chained with bi-directional data transmission (write and read) which allows multiple IS32FL3749 connection and tolerate up to 18V for LEDs, nominal operation voltage between 4.3V to 16V, multiple LED's can be connected in series to supports 4 LEDs/string with max.24×4×4=384 LEDs/chip (Please refer to Fig.2). Only 3pcs IS32FL3749 (384x4) can drive more than thousands (1152) LEDs for LED display (Please refer to Fig.3). Proprietary programmable algorithms are used in IS32FL3749 to minimize audible noise that can result from MLCC decoupling capacitor. SL, GCC and all other registers can be programmed via a highspeed VSB (video series bus, up to 33MHz) or SPI (up to 33MHz) serial interface port. IS32FL3749 shutdown mode can put the device to sleep (for minimum power consumption) while retaining all register values. It helps to reduce system cost, thermal caused by power dissipation and smaller PCB size in customers application.

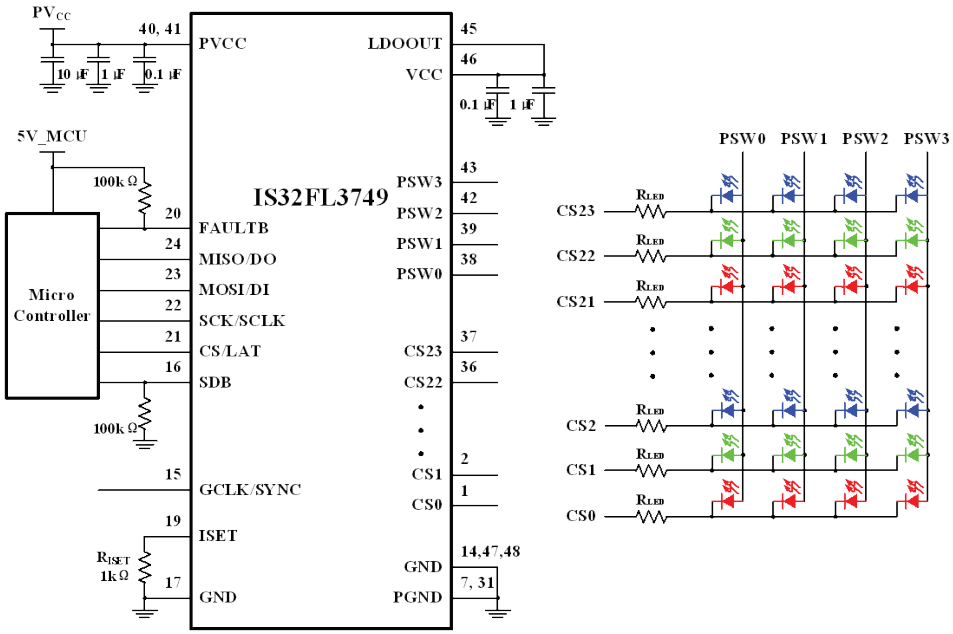

Figure 1

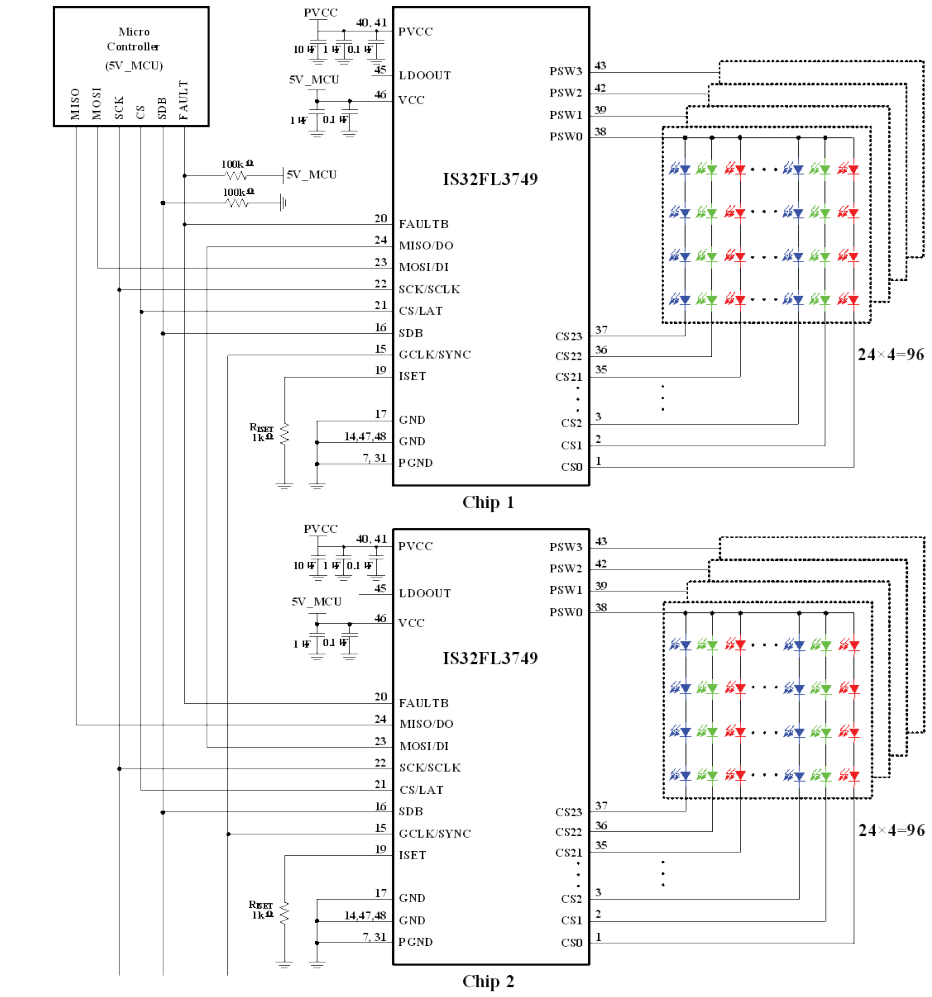

Figure 2

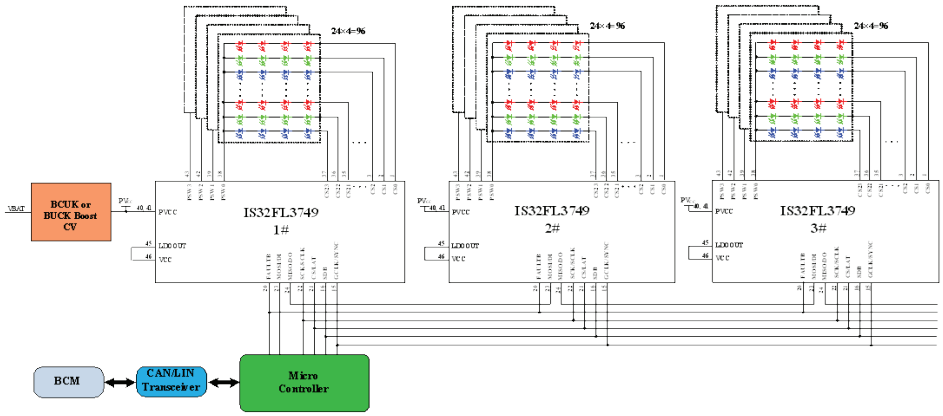

Figure 3

The device features VCC= 3.0V to 5.5V, support 24 constant current channels, which is 60mA/channel maximum, and it supports from one to four power scan to become a 24×n (n=1~4) matrix LED driver. Also 8 bits (256 steps) DC Current Scaling, Individual 16-bit, 8+8-bit dithering, 8+4-bit dithering, 8-bit PWM mode, 8 bits (256 steps) Global Current Control (GCC) and 3 GCC sets for each color group. Constant Current Accuracy offers Channel to Channel = ±7%(Max.); Device to Device =±7%(Max.). 33MHz Grayscale Control Clock gives excellent contract ratio for video display. Display timing reset, Selectable Traditional PWM and ES-PWM (dithering) for high resolution color and Real-time LED open detection (LOD), Real-time LED short detection (LSD) help customer easy to diagnostic fault LED in production and development stage as well as the reliability of the display can be improved by the LOD, LSD function. Spread Spectrums to reduce EMI, over temperature protection to protect damage of system and Software shutdown mode to save power, 180-degree phase delay operation to reduce power noise.

IS32FL3749 has higher LED voltage (16V vs. 14V), high-speed interface (SPI or VSB), and lower Iq and ISD current than competitor products, and provide more dot DC Scaling (256 steps) and 256 steps GCC to adjust brightness and color flexibly. Refer Table. 1 for detail.

IS32FL3749 has AEC-Q100 qualification with operating temperature of-40°C to 125°C. It is available in an eTQFP-48 (7mm × 7mm) package. IS32FL3749 targets Mini LED Back Light, Automotive LED Back Light, Automotive Center Information Display, Automotive Signage and LED Video Displays.

Items	IS32FL3749	MAX25503
VIN or VCC	3.0V~5.5V	3.135V~5.5V
PVCC	4.3V~16V, the LED current-sink outputs can operate at up to 18V	up to 14V
(Matrix)Dots	96	96
RGB	32	32
LED Current Per Channel	60mA	65mA
ISD (uA)hardware shutdown	PVCC: 10μA Typ. 15μA Max. VCC: 3μA Typ. 5μA Max.	/
ISD (uA)software shutdown	PVCC: 450μA Typ. 600μA Max. VCC: 160μA Typ. 300μA Max.	/
ICC (mA)	VCC: 2mA Typ. 5.5mA Max. PVCC: 8mA Typ. 10mA Max.	VCC:18mA Typ.
Interface	SPI 33MHz, VSB 33MHz	SPI
Global current (DC)	8-bit ×3 global current setting	/
Current Setting Resolution (dot DC)	8-bit (256 steps)	5-bit (32 steps)
PWM Control Resolution	8-bit, 8+4-bit dithering 16-bit, 8+8-bit dithering	17-bit Max.
PWM frequency (8-bit PWM)	16MHz -> 62.5KHz, 32MHz -> 125KHz 8MHz -> 31KHz, 0.25MHz -> 1KHz 12MHz -> 47KHz, 24MHz -> 94KHz 6MHz -> 23.5KHz, 0.19MHz -> 0.7KHz	61.44KHz Max.
PSW Random Scan	Yes	/
De-ghost	Yes	Yes
Open short detect	Yes	Yes
Spread spectrum	Yes	Yes
Synchronization input	Yes	Yes
Power noise reduction	4 groups delay, (left,right,two sides)	Optional Individual Programmable Delays
Protection	Thermal shutdown PSW short protection PSW Over Current Detection	Over temperature protection Sink short to GND ISET out of range detect Thermal shutdown
Other Function	Low standby and sleep mode current Support bi-directional data output via DI Thermal Roll Off	FB Output to Control External DC-DC Converter
Operating T Range (°C)	40~125	-40~125
Pin/Package	eTQFP-48 (Body Size:7mm ×7mm)	TQFN48 (7mm*7mm) TSSOP48

Table 1