

Supertex Driver Evaluation Board for OSRAM OSTAR™ LED

General Description

The Supertex HV9910DB6 is a simple, constant-current, LED driver evaluation board designed to drive OSRAM's 6-chip or 4-chip OSTAR™ from a 24V supply.

The board uses the Supertex HV9910B in a buck configuration in a constant off-time mode. The peak current control scheme enables fairly accurate control of the LED current with a very simple control scheme and a low part count.

The information in this datasheet also applies to the demoboards which have the Supertex HV9910.

Specifications

Parameter	Value
Input voltage	24V ± 10%
LED string voltage	12 - 20V
Output current	700mA ± 10% for 6-chip OSTAR
	750mA ± 10% for 4-chip OSTAR
Switching frequency	Variable
Efficiency@ 24V input	94% for 6-chip OSTAR
	91% for 4-chip OSTAR
Open LED protection	Yes
Output short circuit protection	No
Board dimensions	42mm x 16mm

Connection Diagram



Connections

1. Connect the input voltage source between VIN and GND as shown.
2. Connect the LED load between VO+ and VO- as shown (anode to VO+ and cathode to VO-).

Operation of the LED Driver

The Supertex HV9910B LED Driver is a constant off-time, peak current-controlled buck converter. Constant off-time mode of operation is necessary to ensure stability of the peak current mode control since the duty cycle of operation is greater than 50%. The constant off-time operation gives a very good line regulation, making the LED current almost independent of the input voltage. However, constant off-time operation increases the variation of the LED current with the LED string voltage, since the inductor current ripple is highly dependent on the load voltage. This is typically not a problem since the LED voltage variation for a given load is fairly small.

Typical Results

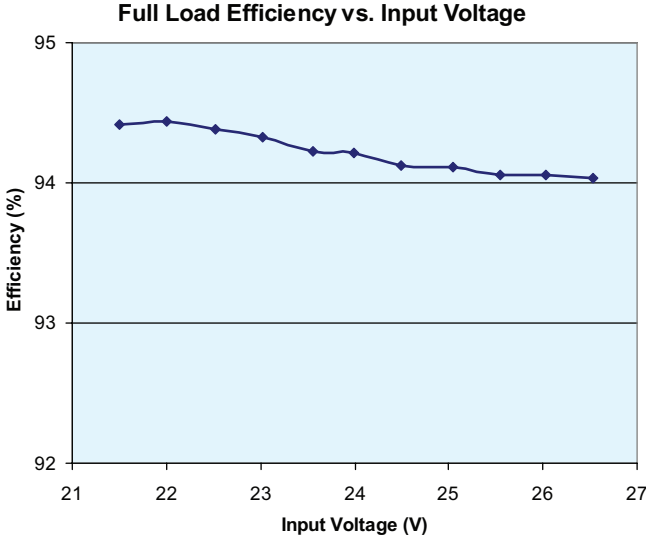


Fig. 1. Full Load Efficiency Plot

Fig. 1 shows the full load efficiency of the LED driver over the input voltage range of the driver.

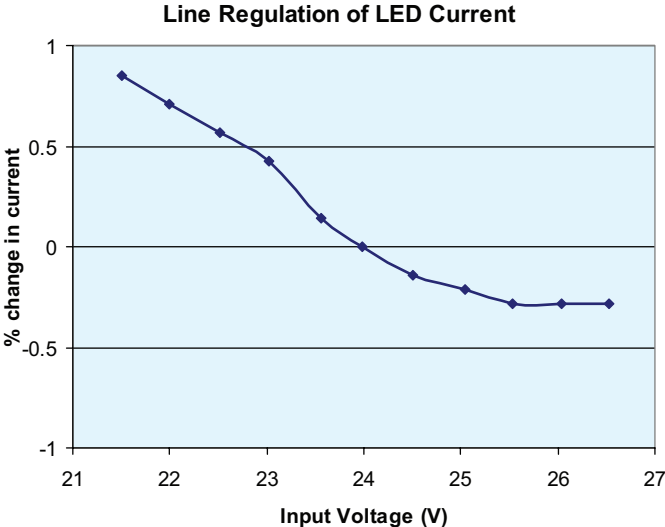


Fig. 2. Line Regulation of Output Current

Fig. 2 shows the line regulation of the driver over the input voltage range.

Typical Results

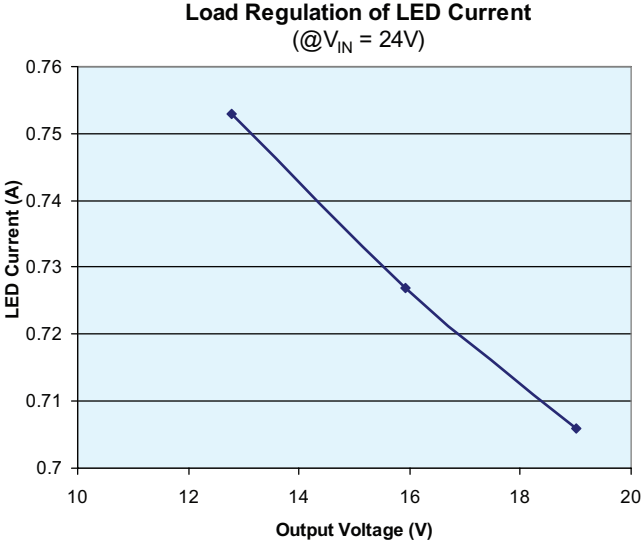


Fig. 3. Load Regulation of Output Current

Fig. 3 shows the variation of the output current with output voltage.

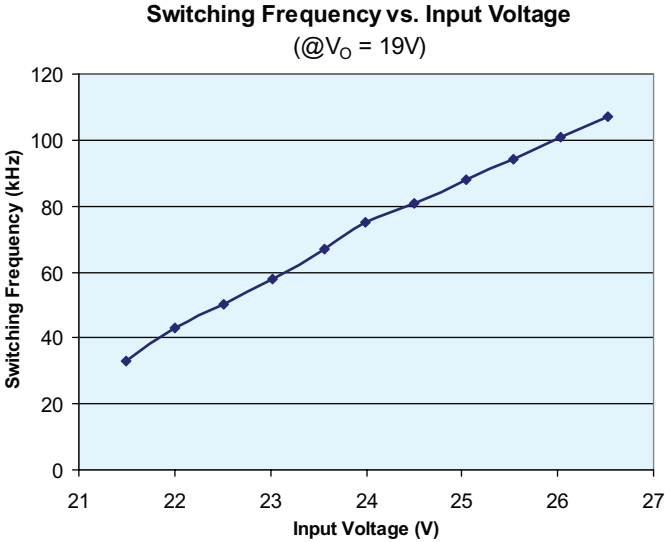


Fig. 4a. Switching Frequency Variation with Input Voltage

Fig. 4a shows the variation of the switching frequency over the entire input voltage range.

Typical Results

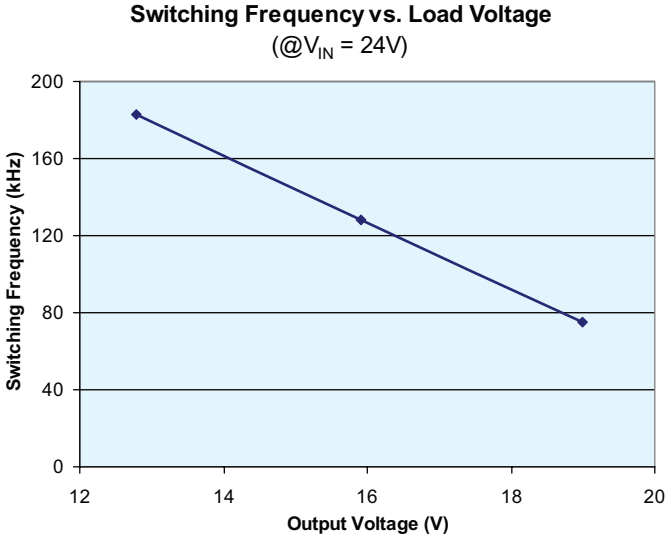


Fig. 4b. Switching Frequency Variation with Output Voltage

Fig. 4b shows the variation of the switching frequency with the load voltage.

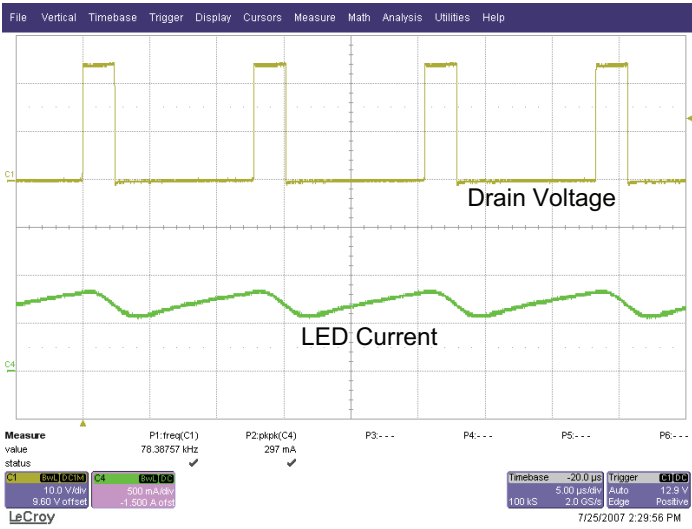


Fig. 5a. Steady State Waveforms for a 6-chip OSTAR

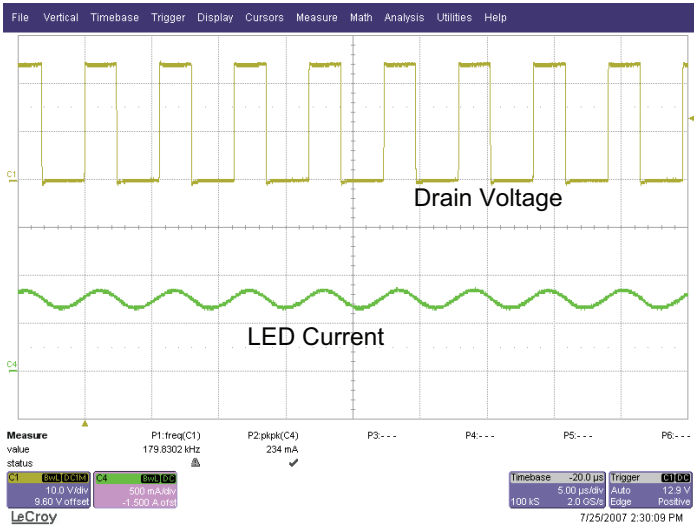
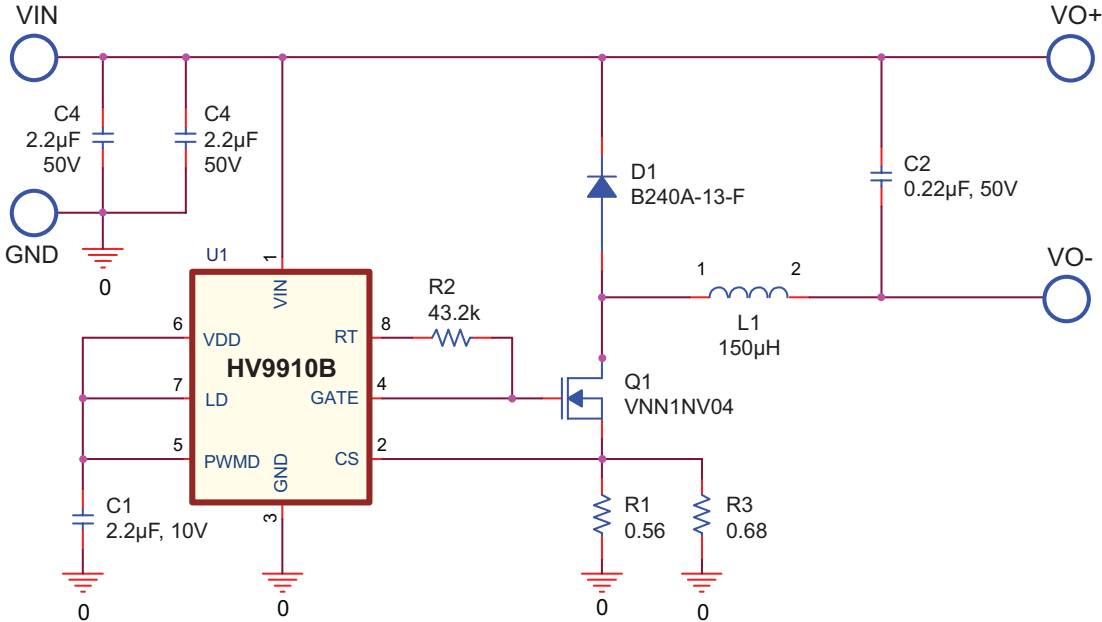


Fig. 5b. Steady State Waveforms for a 4-chip OSTAR

Fig. 5 shows the steady state waveforms of the LED driver driving the OSTAR loads.

Schematic



Bill of Materials

Item #	Qty	Ref	Description	Package	Manufacturer	Manufacturer's Part Number
1	1	C1	2.2µF, 16V, X7R ceramic chip capacitor	SMD0805	Kemet	C0805C225K4RACTU
2	1	C2	0.22µF, 50V, X7R ceramic chip capacitor	SMD0805	Murata	GRM21BR71H224MA01L
3	2	C3, C4	2.2µF, 50V, X7R ceramic chip capacitor	SMD1206	Murata	GRM31CR71H225KA88L
4	1	D1	40V, 2.0A schottky diode	SMA	Diodes Inc	B240A-13-F
5	1	L1	150µH, 1.05A rms, 1.15A sat inductor	SMT	Cooper Electronics	CD1-151
6	1	Q1	40V, 1.7A N-channel FET	SOT223	ST Micro	VNN1NV0413TR
7	1	R1	0.56Ω, 1/8W, 1% chip resistor	SMD0805	Panasonic	ERJ-6RQFR56V
8	1	R2	43.2kΩ, 1/8W, 1% chip resistor	SMD0805	Yageo	RC0805FR-0743K2L
9	1	R3	0.68Ω, 1/8W, 1% chip resistor	SMD0805	Panasonic	ERJ-6RQFR68V
10	1	U1	Universal LED Driver	SO-8	Supertex	HV9910BLG-G

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