High voltage LED driver IC series with build in power FET

Òechnology: HVCMOS	Status: Engineering samples	HM9921/2/3

Features:

High voltage 85-265 V (ÀÑ) operation

Fixed DC output currents - 20/50/30 mÀ

Internal HV MOSFET switch with 475V (min) breakdown voltage

Applications:

Led lamps with AC or DC operation

LED decoration

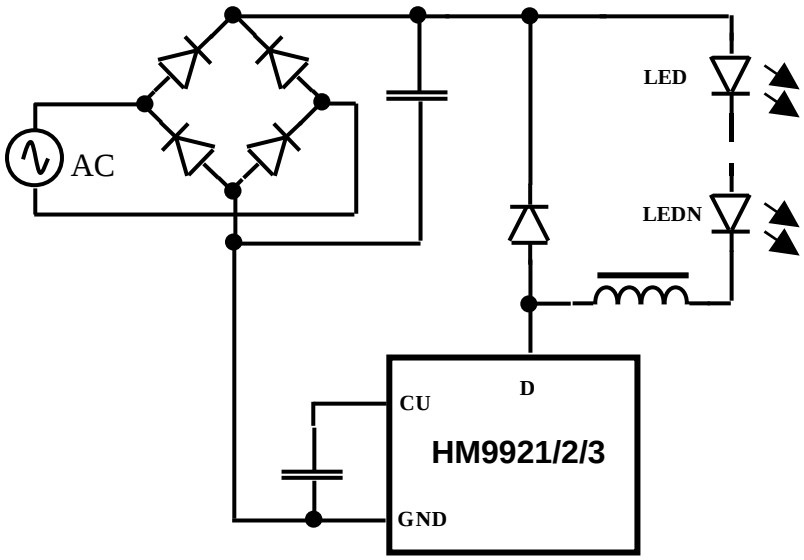
Description:

Each IC in series is a pulse width modulated (PWM) high efficient operation of LED driver control IC with internal high voltage power switching MOSFET. Having HV MOSFET allows to use direct supply-line voltage (220VAC=320VDC). The LED string is driven at constant current, thus providing constant light output and enhanced reliability.

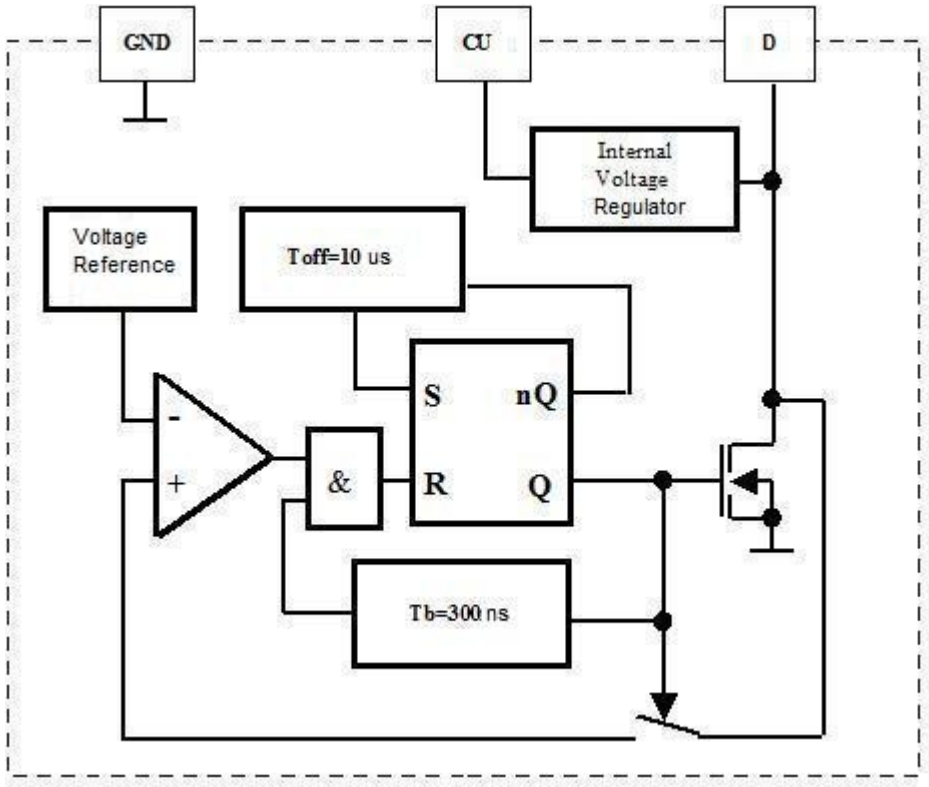
The IC has constant time off PWM architecture. The peak current control scheme provides good regulation of the output current throughout the universal AC line voltage range of 85 to 264VAC or DC input voltage of 20 to 400V.

The ICs in series differ from each other in values of fixed output currents, i.e. HM9921-20mA, HM9922-50mA, HM9923-30mA.

Typical Application Circuit



Functional Block Diagram



Pin Description

Name	Description
GND	Common pin
CU	Output for bypass capacitor
D	Drain terminal of the output switching MOSFET and a linear regulator input

Package

SOT-89

Electrical Characteristics

Ta= 25°C, Ud=50V, unless otherwise noted

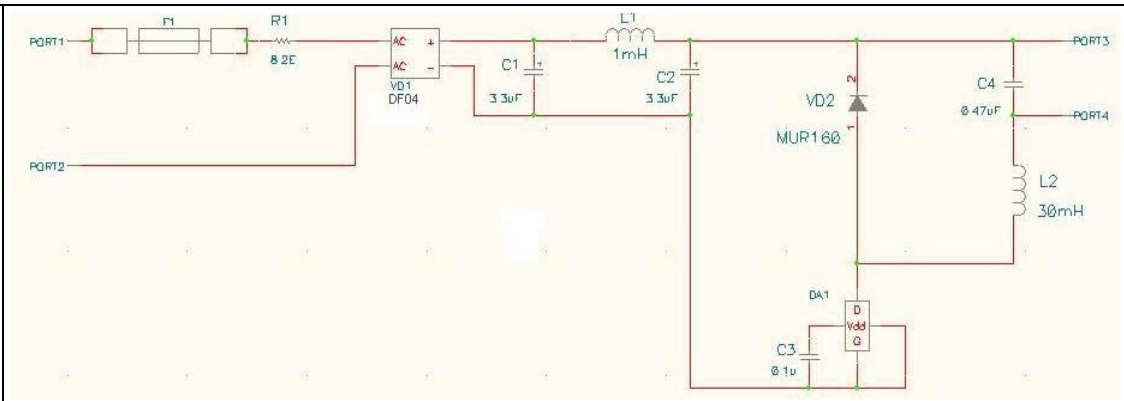
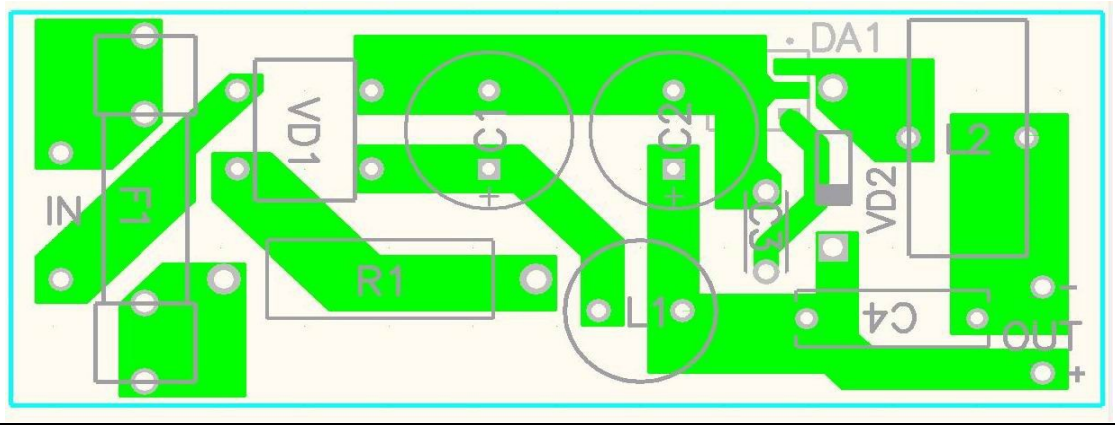
Symbol	Parameter	Min	Typ	Max	Units
Udd	Internal regulator output		6.0		V
Id	Supply current			400	µA
Udrain	Supply voltage	20	320	400	V
Udb	Breakdown voltage	475			V
Ron	On-resistance			200	Îm
Idp	Peak current HM9921 HM9922 HM9923	18 49 28		26 63 38	mÀ
Tb	Leading edge blanking delay	200	300	400	ns
Ton	Minimum on-time			650	ns
Toff	Off-time	8	12	18	µs

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Units
Operating temperature range	-40	25	70	°Ñ
Power dissipation (SOT89)			1300	mW
Operating voltage on D output with regard to GND			440	V

Demo board

Schematic diagram and printed board of 35mA LED driver is presented below.

Schematic diagram	
Printed board layout	

Component list description:
1) F1 – Fuse 160 mA;
2) R1 – Resistor S2-23 8.2E 5% 2W;
3) VD1 – DF04M single phase 1.0 amp bridge rectifiers;
4) C1, C2 – Capacitor K50-35 3.3uF 400V 85oC;
5) L1 – Inductor RLB0914-102KL 1000uH;
6) VD2 – MUR160RL Switch mode power rectifiers;
7) DA1 – Led Lamp Driver IC (HM9923);
8) C3 – Capacitor K10-17 0.1uF Y5V, +80-20%, 0805;
9) C4 – Capacitor K73-17 0.47uF 400V 5-10%;
10) L2 – Inductor 30mH. The coil contains 50 coils reeled up on ring ferrite of mark N31 with magnetic permeability 2500. The size of a ferrite ring is 16x10x7mm.

Measured Temperature Stability of Output Current (HM9923)