



LED Driver Demo Board

Input 30-160VAC // Output 350mA, 3.5-40V (35W max.)

General Description

The AN9911DB1 is an LED driver capable of driving up to 25 one-watt LEDs in series from an input of 110VAC. The demo board uses AN9911 in a buck topology with the HV7800 used for high side current sensing. The converter has a very good initial regulation (+/-5%) and excellent line and load regulation over the entire input and output voltage range (<+/- 2%). The full load efficiency of the converter is typically greater than 85%.

The AN9911DB1 is protected against open LED and output short circuit conditions. It is also protected

from input under voltage conditions. It has a very good PWM dimming response, with typical rise and fall times of less than 5.0µs, which will allow high PWM dimming ratios.

The switching frequency of the AN9911DB1 can be synchronized to other AN9911 boards or to an external clock by connecting the clock to the SYNC pin of the AN9911DB3.

| Specifications | |
|---|---|
| Input voltage | 30 to 160VAC, 50Hz |
| Output voltage: | 3.5 to 100V |
| Output current: | 350mA +/-2% |
| Output power: | Up to 35W |
| Efficiency | 85% |
| Output current ripple | 20% |
| Output short circuit protection | Yes |
| Output overvoltage, open circuit protection | Yes |
| Constant Off Time | 15 us |
| Switching frequency in Constant Off Time mode | About 60kHz (depends on the input and output voltage) |
| Constant frequency mode | Yes, 60kHz |
| Dimensions: | 75 x 50 x 28 mm |

Warning!

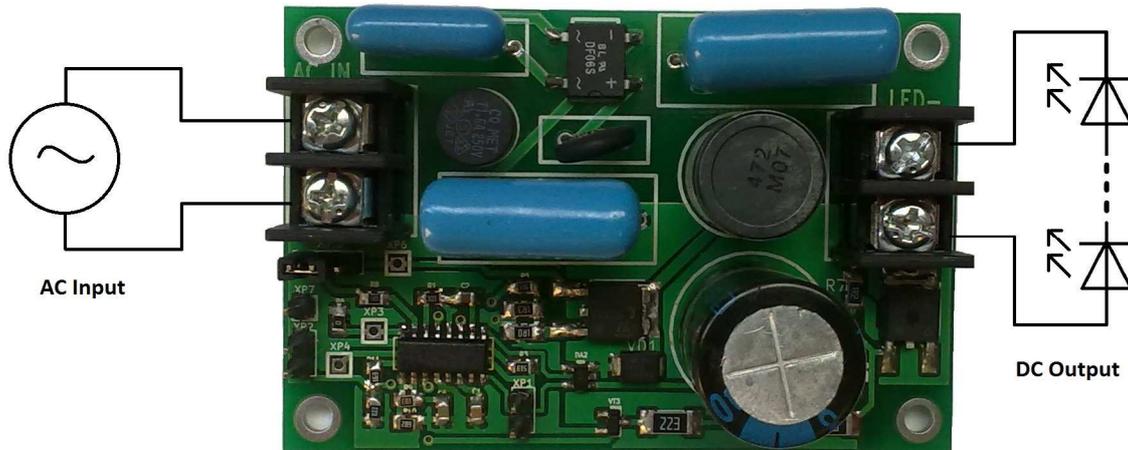
Working with this board can cause serious bodily harm or death. Connecting the board to a source of line voltage will result in the presence of hazardous voltage throughout the system including the LED load.

The board should only be handled by persons well aware of the dangers involved with working on live electrical equipment. Extreme care should be taken to protect against electric shock. Disconnect the board before attempting to make any changes to the system configuration. Always work with another person nearby who can offer assistance in case of an emergency. Wear safety glasses for eye protection.

The electrolytic capacitor carries a hazardous voltage for an extended time after the board is disconnected. Check the capacitor voltage before handling the board.



Board Connections

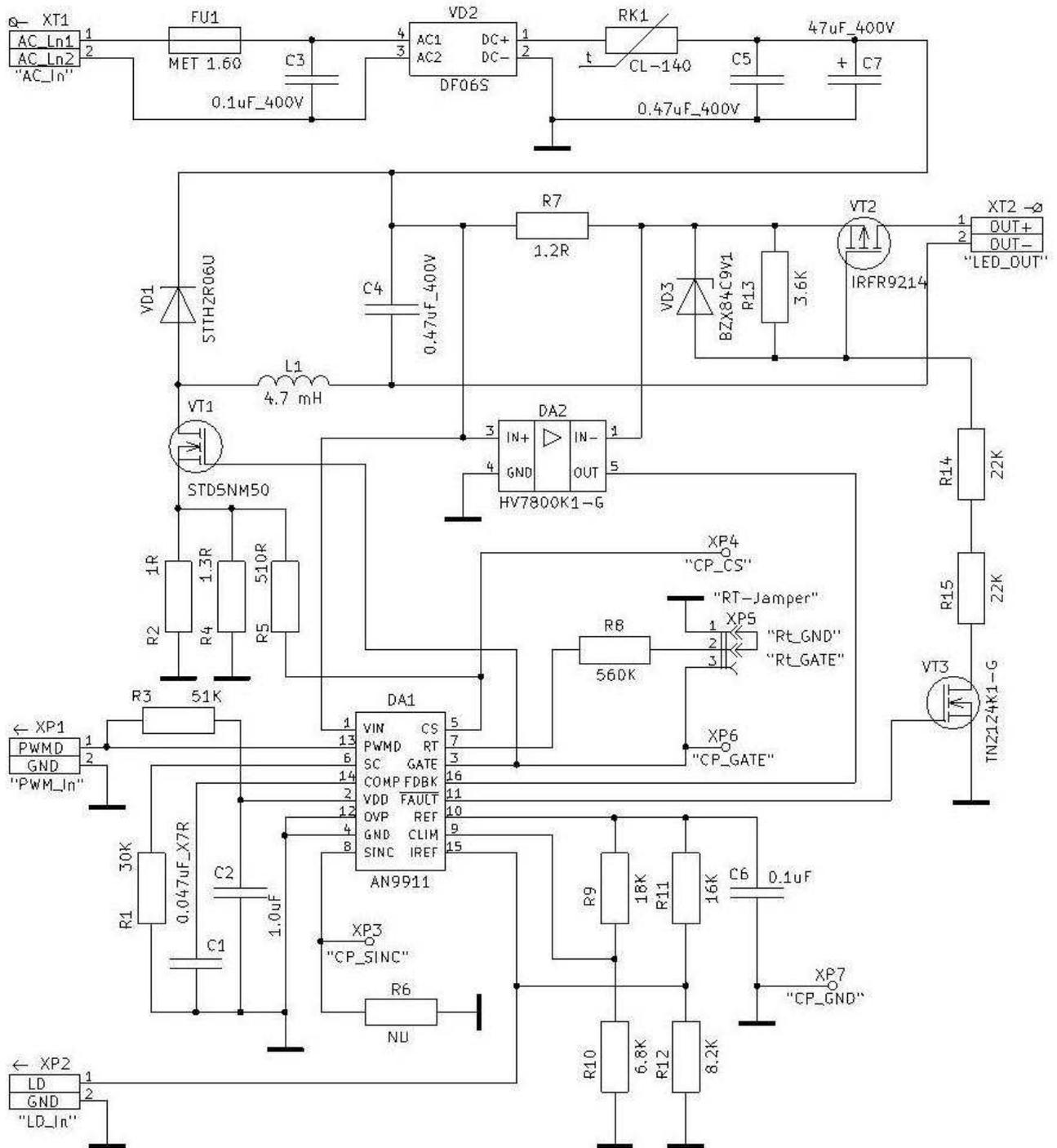


Connection Instructions

1. Carefully inspect the board for shipping damage, loose components, etc, before making connections.
2. Connect the board to the line and load as shown in the diagram. Be sure to check for correct polarity when connecting the LED string to avoid damage to the string. The LED string voltage can be anything between 3.5 and 100V.
3. Energize the mains supply.

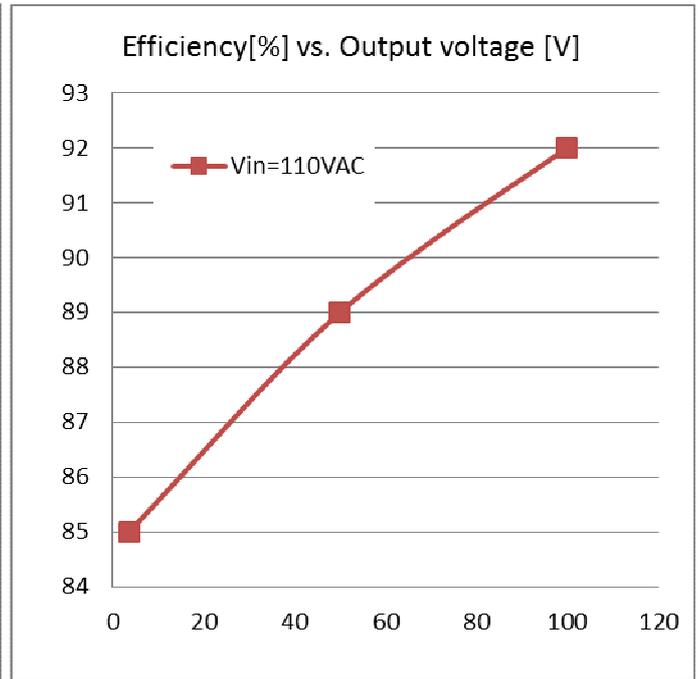
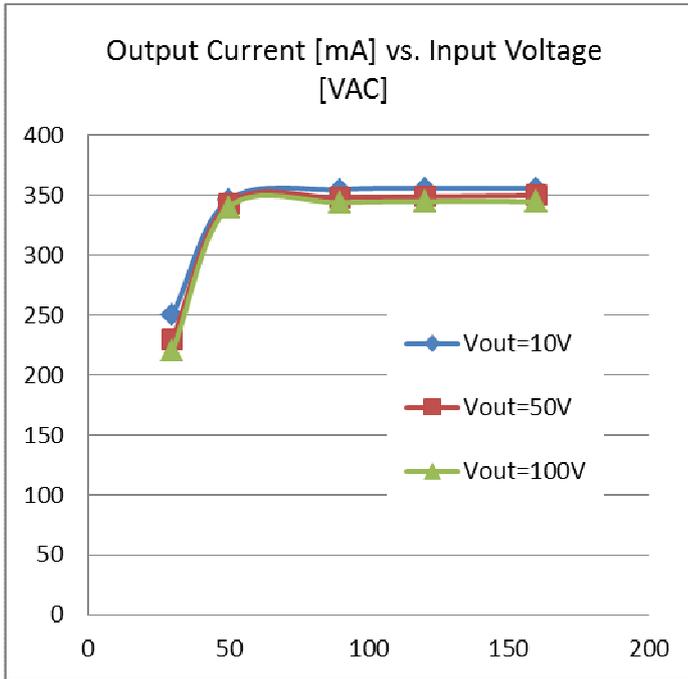


Schematic Diagram

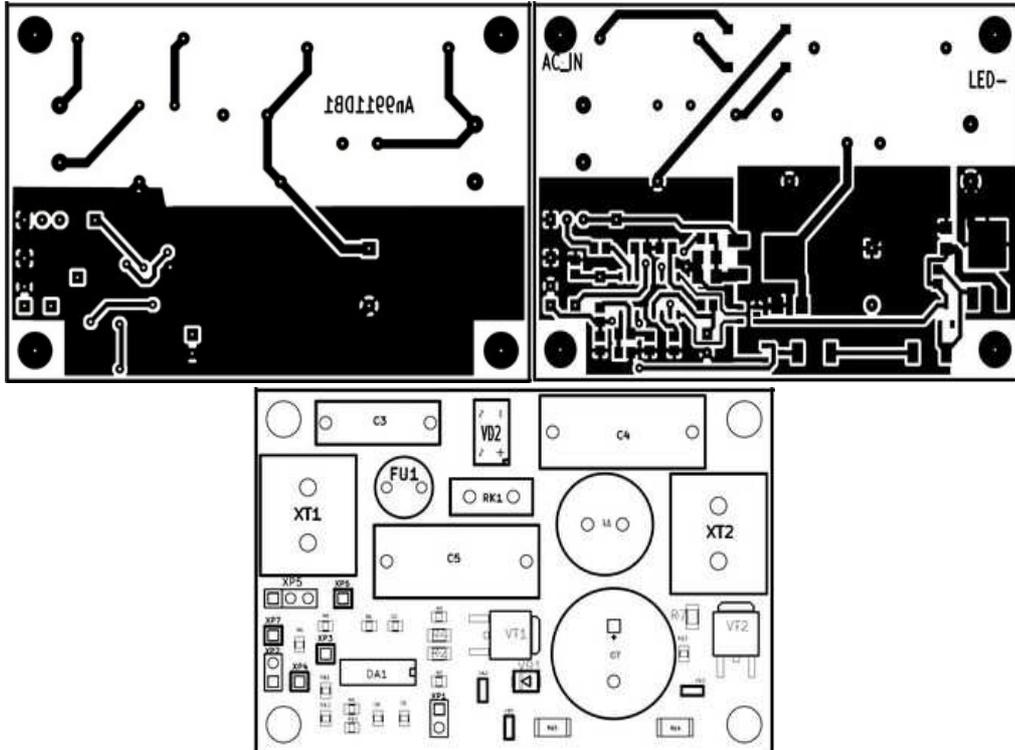




Typical Characteristics



PCB Layout



**Bill of Materials**

| Qty | REF | Description | Manufacturer | Product Number |
|-----|----------|-----------------------------------|--------------------|------------------|
| 1 | C1 | Cap Cer X7R 0805 0.047uF 25V | Kemet | C0805C473K1RACTU |
| 1 | C2 | Cap Cer X7R 0805 1uF 25V | Kemet | C0805C105K1RACTU |
| 1 | C3 | Cap MEF 0.1uF 400V | Shengxin | CL21-0.1uF-400V |
| 2 | C4, C5 | Cap MEF 0.47uF 400V | Shengxin | CL21-0.47uF-400V |
| 1 | C6 | Cap Cer X7R 0805 0.1uF 25V | Kemet | C0805C104K1RACTU |
| 1 | C7 | Cap Alel ED Rad 400V 47uF | Panasonic ECG | ECA-2WM220 |
| 1 | DA1 | IC LED Driver SO-16 | Angstrom | AN9911 |
| 1 | DA2 | IC Operational Amplifier | Supertex | HV7800K1-G |
| 1 | FU1 | Fuse 1.6 A 250V | Conquer | MET1.6 |
| 1 | L1 | Inductor 4.7 mH 0.48A | Sumida | RCP1317NP-472L |
| 1 | VD1 | Diode UltraFast SMB 600V 2A | ST | STTH2R06U |
| 1 | VD2 | Rect Bridge 600V 0.5A | Vishay | DF06S |
| 1 | VD3 | Zener Diode 9.1V 250mW | Diotec | BZX84C9V1 |
| 1 | VT1 | Transistor N-MOSFET 600V 4A | Angstrom | IRFR9214 |
| 1 | VT2 | Transistor P-MOSFET 250V 2.7A | IR | AN4N60 |
| 1 | VT3 | Transistor N-MOSFET 240V 15 Ohm | Supertex | TN2124K1-G |
| 1 | R1 | Res 0805 5% 30kOhm | --- | --- |
| 1 | R2 | Res 1206 1% 10Ohm | --- | --- |
| 1 | R3 | Res 0805 5% 51kOhm | --- | --- |
| 1 | R4 | Res 1206 1% 1.3Ohm | --- | --- |
| 1 | R5 | Res 1206 1% 510Ohm | --- | --- |
| 1 | R6 | NU | --- | --- |
| 1 | R7 | Res 1206 5% 1.2Ohm | --- | --- |
| 1 | R8 | Res 0805 5% 560kOhm | --- | --- |
| 1 | R9 | Res 0805 5% 18kOhm | --- | --- |
| 1 | R10 | Res 0805 5% 6.8kOhm | --- | --- |
| 1 | R11 | Res 0805 5% 16kOhm | --- | --- |
| 1 | R12 | Res 0805 5% 6.8kOhm | --- | --- |
| 1 | R13 | Res 0805 5% 3.6kOhm | --- | --- |
| 1 | R14 | Res 2010 5% 22kOhm | --- | --- |
| 1 | R15 | 2010 5% 22kOhm | --- | --- |
| 1 | RK1 | 50ohm Thermistor Tolerance B± 25% | GE SENSING | CL-140 |
| 2 | XT1, XT2 | Terminal Block 250VAC 1A | Ninqbo | TB-10-2 |
| 6 | XP1-XP6 | PLS-connectors step 2.54mm | Connfly Electronic | DS1021 |