WTEB-D155D-120 Circuitry description

The product is designed for driving electronically ballasted fluorescent lamps. It is a typical half bridge circuit drives by a monolithic integrated circuit. It include a EMI bate circuit, diploid commutate & filter circuit, a half bridge consists of 2 discrete power MOSFETs and series resonance LC circuit, an oscillator, a lamp voltage monitor, a current detect and control circuit, some protection circuit.

The minimum frequency is determined by R3,R21 and C7. As a result the maximum preheat frequency is equal to 2.5 multiple-frequency of minimum frequency determined. During the start-up phase the working frequency start at the maximum frequency. As the load on the half bridge circuit consists of the series connected LC circuit, this is a safe frequency at which currents and voltages are low. R3, R21 and C5 determines the preheating time. The preheating current, which is flowing through the electrodes and lamp capacitor C20, is controlled by the preheat current sensor circuit (PCS) and is determined by R11 and R25. As the lamp voltage should not exceed during this phase a certain maximum value, C20(6.8nF) is determined.

During the ignition phase the working frequency is decreased due to the charging of C6 by an internally fixed current.. During this continuously decrease in frequency ,the circuit approaches the resonance frequency of the load(T2 and C20). The ignition of the lamp is designed above the V-lamp fail level. If the lamp voltage passes the V-lamp fail level the ignition timer is started .If the preheating of the electrodes was correct, the increasing voltage across the lamp will ignite it. The frequency will further decrease until the minimum frequency is reached .Then it is assumed that the lamp is ignited and the Burn state begins. If however at the end of the ignition time the lamp voltage still exceeds the lamp fail level(V-lamp>V-lamp fail),then it is assumed that the lamp is not ignited and the IC will be switched in the Power Down state.

During the ignition of the lamp and the Burn phase the Capacitive Mode protection(ACM)ensures a safe operation of the Power MOSFET. The ignition voltage however with the ageing of the lamp. To avoid overload of the key components, the maximum ignition voltage(V-lamp max) is limited and controlled by the lamp voltage sensor(LVS)circuit(pin 13)。The maximum ignition time, in which the lamp should ignite, is determined R3,R21 and C5.

In the burn state the average current sensor (ACS) of the IC controls the lamp current, the lamp power can be kept constant by controlling the averaged voltage across resistor R11. In this way the lamp current is controlled. Dimming is performed by changing the reference level at the CS+ pin(pin15) by turning rheostat VR. In this way the input voltage of the voltage controlled oscillator regulates the frequency and herewith the lamp current.

The start-up current for the IC is derived from the diploid commutate & filter circuit, R6,R7,R8 and one of the lamp electrodes. If the lamp is not present, the IC will not start-up. As soon as VDD_{high} is exceeded the IC starts oscillating. The half bridge voltage together with C13,D5,D6,C8,C9 (dv/dt) capacitors behave like a current source, which supplies not only the IC and the MOSFET but generates also a stable 13V supply.