

Review on High Voltage DC Power Supply for Pulsed Power Supply Application

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Abstract— For High voltage DC-DC Power supply is developed by using of constant DC supply availability for high voltage DC Power. A performance of maximum DC Supply is carried out for getting maximum DC in minimum time. A protection circuit for availability of DC link to isolator output with voltage comparator is a switching relay which is bypassing resistor for maximum DC supply.

Keywords—DC link, capacitor, potential divider, Impedance matching, Voltage ripple, Power Factor Correction(PFC)

I. INTRODUCTION

In India 230 V, 50 Hz AC supply is available. A rectifier is rectifying of giving DC link supply to resistor as with non-inductive resistor is connected serially or parallel with capacitor, which gives maximum supply of DC Power for Availability of High voltage high power supply as large capacitance dc filter is necessary to reduce the voltage ripple caused by the converter utility voltage[1]. the power supply becomes tailored to a specific Power Amplifier and dc voltage changes or exhibits different sensitivities to redesign of DC power supply may be necessary[2]. Thus, there is a need of new techniques which is suggested from a direct operation of common DC Supply as discussed And also converting AC to DC in minimum time for continuously availability of supply for pulsed power application.

II. Types of DC supply

Today usually one of from these two design technologies are used to generate DC power supply is linear or switching technology.

In the beginning of evolution for DC Power delivery, linear technology is firstly used to provide DC power supply for home or manufacturing sector application, as this supply is readily available and also primarily used in broadcasting. Linear section are directly from transformer to load through two section DC filter and to a load, here there is a comprise of large capacitors and also at end power loss is in between of 20 % to 50% as a system is also very coasty [3].

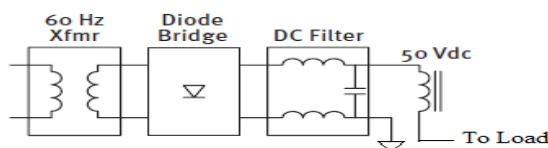


Fig.1. Linear DC supply with one large 60 Hz iron-core Transformer

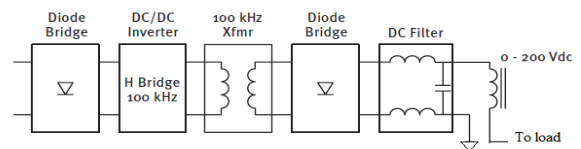


Fig.2. DC-DC Input with switching output

The advantage of using switching technology, which has Less Power Dissipation, reduced stored energy and reduction in system size. Since this technology utilize advanced thick film hybrid technology that allows for less variation in component design, reduction in mechanical packaging and less weight[3,4]

III. Steady DC Voltage Supply

The analysis of an AC/DC Involves Two Operating Frequencies i.e line frequency and high frequency. Input power is rectified sinusoidal which means conversion is varying periodically, so a number of single-stage and two stage PFC circuits have been reported in the literature. Although the two-stage PFC circuits offer excellent performance in terms of input power factor, hold up time capability, no low-frequency ripple in the output, due to this they have the disadvantages of low-power density and high cost. For some application, the single-stage (SS) PFC is more preferable due to galvanic isolation and high power density [5-7].

In a minimum Duty Cycle to get a steady supply voltage divider under a calibration which shows a Principle of voltage measurement (fig.3), resistors R1 and R2 have almost the same resistance values, and the two power supplies provide currents such that almost the same voltage drop of V_0 appears across R1,R2 and R_{R1} . By switching the connections to measure the voltages V_1 and V_2 the resistance ratio of R_1/R_2 is given by

$$\frac{R_2}{R_1} = 1 + \frac{V_2 - V_1}{V_0} \quad (1)$$

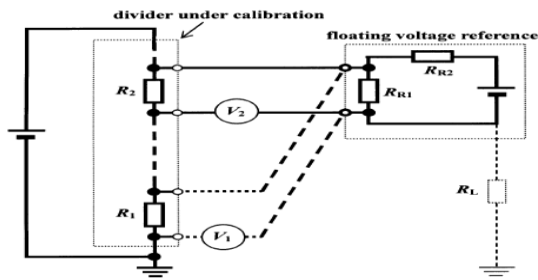


Fig.3.Principle of the measurement of the ratio R1/R2[8]

From a given principle of the measurement, whose internal impedance is equal to voltage across a output measure resistor which gives advantage to isolator whose calibrating system is developed by combining an automated voltage divider and 1V josephon Voltage standard has been developed[9]. Similarly with a divider made up of 100 resistive elements connected in series, with a similarity of above principle to compare the voltage across each resistive segment with the voltage across the lowest segment, as this method was used for both the section 100/10and 1000/10 section. Figure is a schematic of the system[10].

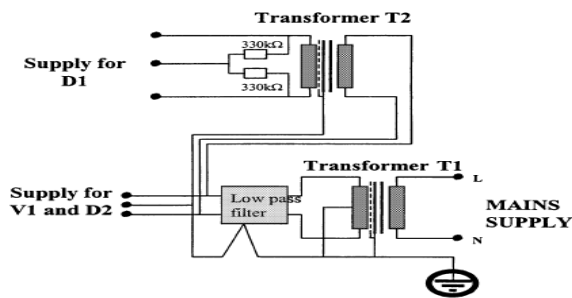


Fig.4.symmetric, filtered & isolated mains supply for V1and D2.floating main supply for D1.

Main advantage of this system was electrically isolated and symmetric around “zero voltage” by using a isolation transformers as the output is twice time filtered with low pass filter before applying the voltage source V1 for divider and Detector D2. An isolated Dc output from isolator calibrating measurement system is not overloading a voltage comparator circuits, which is fixing a reference voltage as minimum duty cycle which compare with input from isolator. In early days for controlling voltage a four different type of topologies are used with a study of datasheet regarding differential comparator ICs circuits which is replacing this topology with a controlling specification[11,12], it is readily available in market, for comparing purpose we can use it for switching transistor which is connected to a load ,npn transistor for switching at $V_{BE} > 0.3$ v for germanium and $V_{BE} > 0.7$ for silicon for behaving transistor as a switch, it characteristics and details are also discussed as per figure[13].

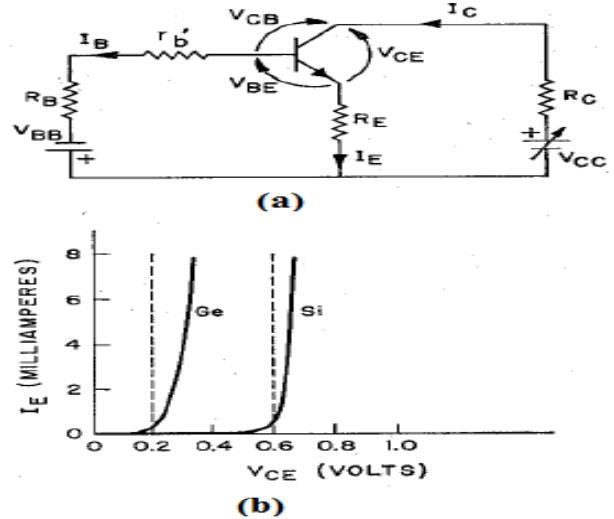


Fig.5. (a) General transistor circuit with emitter base reverse biased
 (b) Forward characteristics of emitter-base diodes

Thus, with this switching it behaves as a switch and bypass load which is connected to contactor for by bypassing resistor due to so capacitor is steadily constantly supplying dc voltage for the pulsed power supply application. Mainly in the next stage of review is for DC-DC power supply switching out with a Pulse Width Modulation For Switching Purpose. The Pulse Power Supply with capacitor energy storage is the integral part of launch system, which is often used as energy storage element for new-concept launch technology. It is because the Pulsed Power Supply can produce enough pulse energy in a very short time, and one of the important ways to obtain such pulse energy is through rapid charge and discharge of pulse capacitor[14].

As per the reviews from this all technical papers I found a stable system review with a theoretical representation for maximum DC voltage power supply is Discussed here with a step wise with a literature block diagram for DC link is As follows.

IV. DC LINK DESIGN PROCEDURE

1. Determine the allowable voltage at the AC input of single /3 phase.
2. Choosing of rectifier with a necessary specification. Of supply.

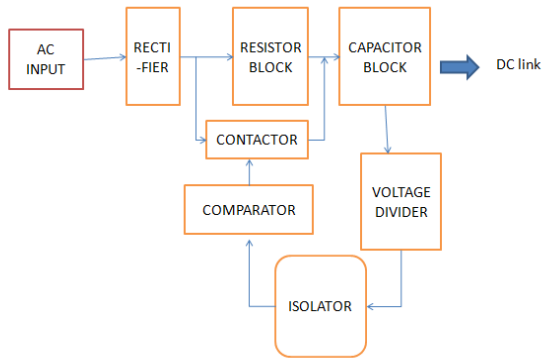


Fig.6.Block Diagram of DC link.

3. Use resistor which is minimizing the time of dc constant for constant dc output.
4. Using of electrolytic capacitor in series/parallel with a fixing of dc link constant.
5. Potential divider across a total charging of capacitor value is taking which is reducing the voltage for using at isolator.
6. Always calculate internal impedance of isolator input and use that value at potential divider for simplifying
Mathematical calculation by using a formula of potential divider
7. Isolator input is isolated and give output as according to isolator hardware output scaling, which is further compared with a reference voltage.
8. Isolator output is compared with a reference set voltage through comparator amplifier which is then switching to a relay.
9. Here there is a use of switching transistor for switching load i.e. relay which is directly give supply to contactor.
10. As contactor coil is ON so resistor is bypassing through capacitor and it will continuously providing a constant DC.

V. CONCLUSION

This paper represents a study of dc Power supply with a new approach of Development of DC Link Steady Constant Filtered DC output ideas with a minimum duty cycle time along with a protection of over loading of high voltage for a different pulsed power supply application, mainly it is very useful for high voltage DC-DC power Supply using industries to overcome from overloading, short-circuit, minimum power. With this a described technology represents an important steps toward performance optimization of DC link Filtration.

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