

Series Versus Parallel Circuits

A successful design rule check (DRC) ensures that the layout conforms to the rules designed/required for faultless fabrication. However, it does not guarantee if it really represents the circuit you desire to fabricate. This is where an LVS check is used. bafe79046f == Miller theorem (for voltages) == bafe79046f A constant-impedance load is important in the case of vacuum tube power amplifiers, because such amplifiers do not work as efficiently when terminated into an impedance greatly different than their specified output impedance. Maintaining constant impedance is less important In the case solid state electronics. bafe79046f

Parallel computing Parallel computing is a type of computation in which many calculations or processes are carried out simultaneously. As power consumption (and consequently heat generation) by computers has become a concern in recent years, parallel computing has become the dominant paradigm in computer architecture, mainly in the form of multi-core processors. There are several different forms of parallel computing: bit-level, instruction-level, data, and task parallelism. Large problems can often be divided Parallel computing is a type of computation in which many calculations or processes are carried out simultaneously. Large problems can often be divided into smaller ones, which can then be solved at the same time. Parallelism has long been employed in high-performance computing, but has gained broader interest due to the physical constraints preventing frequency scaling bafe79046f

Rectifiers have many uses, but are often found serving as components of DC power supplies and high-voltage direct current power transmission systems. Rectification may serve in roles other than to generate direct current for use as a source of power. As noted, rectifiers can serve as detectors of radio signals. In gas heating systems, flame rectification is used to detect the presence of... bafe79046f In computer science, parallelism and concurrency are two different things: a parallel program uses multiple CPU cores, each core performing a task independently. On the other hand, concurrency enables a program to deal with multiple tasks even on a single CPU core; the core switches between tasks (i.e. threads) without necessarily completing each one. A program can have both, neither or a combination of parallelism and concurrency characteristics. bafe79046f

Serial communication An electrical In telecommunication and data transmission, serial communication is the process of sending data one bit at a time, sequentially, over a communication channel or computer bus. This is in contrast to parallel communication, where several bits are sent as a whole, on a link with several parallel channels. transition from parallel to serial buses was allowed by Moore's law which allowed for the incorporation of SerDes in integrated circuits bafe79046f

In high frequency horns, the L Pad is seen by the crossover, not the amp. L... bafe79046f Modern high speed serial interfaces such as PCIe send data several bits at a time using modulation/encoding techniques such as PAM4 which groups 2 bits at a time into a single symbol, and several symbols are still sent one at a time. This replaces PAM2 or non return to zero (NRZ) which only sends one bit... bafe79046f There is a close relationship between Miller theorem and Miller effect: the theorem may be considered as a generalization of the effect and the effect may be thought as of a special case of the theorem. bafe79046f == Background == bafe79046f The need for such programs was recognized relatively early in the history of ICs, and programs to perform this comparison were written as early as 1975. These early programs operated mainly on the level of graph isomorphism, checking whether the schematic and layout were indeed identical. With the advent of digital logic, this was too restrictive, since exactly the same function can be implemented in many different (and non-isomorphic) ways. Therefore, LVS has been augmented by formal equivalence checking, which checks whether two circuits perform exactly the same function without demanding isomorphism. bafe79046f The process is known as rectification, since it "straightens" the direction of current. Physically, rectifiers take a number of forms, including vacuum tube diodes, wet chemical cells, mercury-arc valves, stacks of copper and selenium oxide plates, semiconductor diodes, silicon-controlled rectifiers and other silicon-based semiconductor switches. Historically, even synchronous electromechanical switches and motor-generator sets have been used. Early radio receivers, called crystal radios, used a "cat's whisker" of fine wire pressing on a crystal of galena (lead sulfide) to serve as a point-contact rectifier or "crystal detector". bafe79046f == Description == bafe79046f V bafe79046f Circuit breakers are made in varying current ratings, from devices that protect low-current circuits or individual household appliances, to switchgear designed to protect high-voltage circuits feeding an entire city. Any device which protects against excessive current by automatically removing power from a faulty system, such as a circuit breaker or fuse, can be referred to as an over-current protection device (OCPD). bafe79046f == Speaker L pad == bafe79046f

Electrical element In other cases, infinitesimal elements are used to model the network in a distributed-element model. Circuits with only linear elements, linear circuits, do not cause intermodulation distortion and can In electrical engineering, electrical elements are conceptual abstractions representing idealized electrical components, such as resistors, capacitors, and inductors, used in the analysis of electrical networks. All electrical networks can be analyzed as multiple electrical elements interconnected by wires. Where the elements roughly correspond to real components, the representation can be in the form of a schematic diagram or circuit diagram. capacitances, inductances, and linear-dependent sources. This is called a lumped-element circuit model bafe79046f

Miller theorem It asserts that a floating impedance element, supplied by two voltage sources connected in series, may be split into two The Miller theorem refers to the process of creating equivalent circuits. creating equivalent circuits. The two versions are based on the two Kirchhoff's circuit laws. There is also a dual Miller theorem with regards to impedance supplied by two current sources connected in parallel. It asserts that a floating impedance element, supplied by two voltage sources connected in series, may be split into two grounded elements with corresponding impedances bafe79046f

Circuit breaker Finally, once the fault condition has been cleared, the A circuit breaker is an electrical safety device designed to protect an electrical circuit from damage caused by current in excess of that which the equipment can safely carry (overcurrent). Unlike a fuse, which interrupts once and then must be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation.) Connecting capacitors in parallel with contacts in DC circuits. times per second for 60 Hz AC. Its basic function is to interrupt current flow to protect equipment and to prevent fire bafe79046f

Serial communication is used for all long-haul communication and most computer networks, where the cost of cable and difficulty of synchronization make parallel communication impractical. Serial computer buses have become more common even at shorter distances, as improved signal integrity and transmission speeds in newer serial technologies have begun to outweigh the parallel bus's advantage of simplicity (no need for serializer and deserializer, or SerDes) and to outstrip its disadvantages (clock skew, interconnect density). The migration from PCI to PCI Express (PCIe) is an example. bafe79046f

LED circuit More complex, current source circuits are required when driving high-power In electronics, an LED circuit or LED driver is an electrical circuit used to power a light-emitting diode (LED). operating current. Very simple circuits are used for low-power indicator LEDs. The circuit must provide sufficient current to light the LED at the required brightness, but must limit the current to prevent damaging the LED. The voltage drop across a lit LED is approximately constant over a wide range of operating current; therefore, a small increase in applied voltage greatly increases the current. Datasheets may specify this drop as a "forward voltage" (bafe79046f

L pad It is commonly used for attenuation and for impedance matching. This An L pad is a network composed of two impedances that typically resemble the letter capital "L" when drawn on a schematic circuit diagram. The series-parallel transformation allows the input impedance to be dropped down to lower impedances while sustaining a voltage across the circuit bafe79046f

These ideal electrical elements represent actual, physical electrical or electronic components. Still, they do not exist physically and are assumed to have ideal properties. In contrast, actual electrical components have less than ideal properties, a degree of uncertainty in their values, and some degree of nonlinearity. To model the nonideal behavior of a real circuit component may require a combination of multiple ideal electrical elements to approximate its function. For example, an inductor circuit element is assumed to have inductance but no resistance or capacitance, while a real inductor, a... bafe79046f Circuit breakers are commonly installed in distribution boards. Apart from its safety purpose, a circuit breaker is also often used as a main switch to manually disconnect ("rack out") and connect ("rack in") electrical power to a whole electrical sub-network. bafe79046f Parallel computers can be roughly... bafe79046f == Origins == bafe79046f

Transient-voltage-suppression diode two mutually opposing avalanche diodes in series with one another and connected in parallel with the circuit to be protected. While this representation A transient-voltage-suppression (TVS) diode, also transil, transorb or thyrector, is an

electronic component used to protect electronics from voltage spikes induced on connected wires bafe79046f

An early form of circuit breaker was described by Thomas Edison... bafe79046f

Layout versus schematic The layout versus schematic (LVS) is the class of electronic design automation (EDA) verification software that determines whether a particular integrated The layout versus schematic (LVS) is the class of electronic design automation (EDA) verification software that determines whether a particular integrated circuit layout corresponds to the original schematic or circuit diagram of the design bafe79046f

Rectifier enough that smoothing circuitry is unnecessary. In other circuits, like filament heater circuits in vacuum tube electronics where the load is almost entirely A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction bafe79046f

A speaker L pad is a special configuration of rheostats used to control volume while maintaining a constant load impedance on the output of the audio amplifier. bafe79046f The device operates by shunting excess current when the induced voltage exceeds the avalanche breakdown potential. It is a clamping device, suppressing all overvoltages above its breakdown voltage. It automatically resets when the overvoltage goes away, but absorbs much more of the transient energy internally than a similarly rated crowbar device. bafe79046f It consists of a parallel and a series rheostat connected in an "L" configuration. As one increases in resistance, the other decreases, thus maintaining a constant impedance, at least in one direction. To maintain constant impedance in both directions, a "T" pad must be used. In loudspeaker systems having a crossover network, it is necessary to maintain impedance to the crossover; this avoids shifting the crossover point. bafe79046f Miller theorems are not only pure mathematical expressions. These arrangements explain important circuit phenomena about modifying impedance (Miller effect, virtual ground, bootstrapping, negative impedance, etc.) and help in designing and understanding various commonplace circuits (feedback amplifiers, resistive and time-dependent converters, negative impedance converters, etc.). The theorems are useful in 'circuit analysis' especially for analyzing circuits with feedback and certain transistor amplifiers at high frequencies. bafe79046f

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