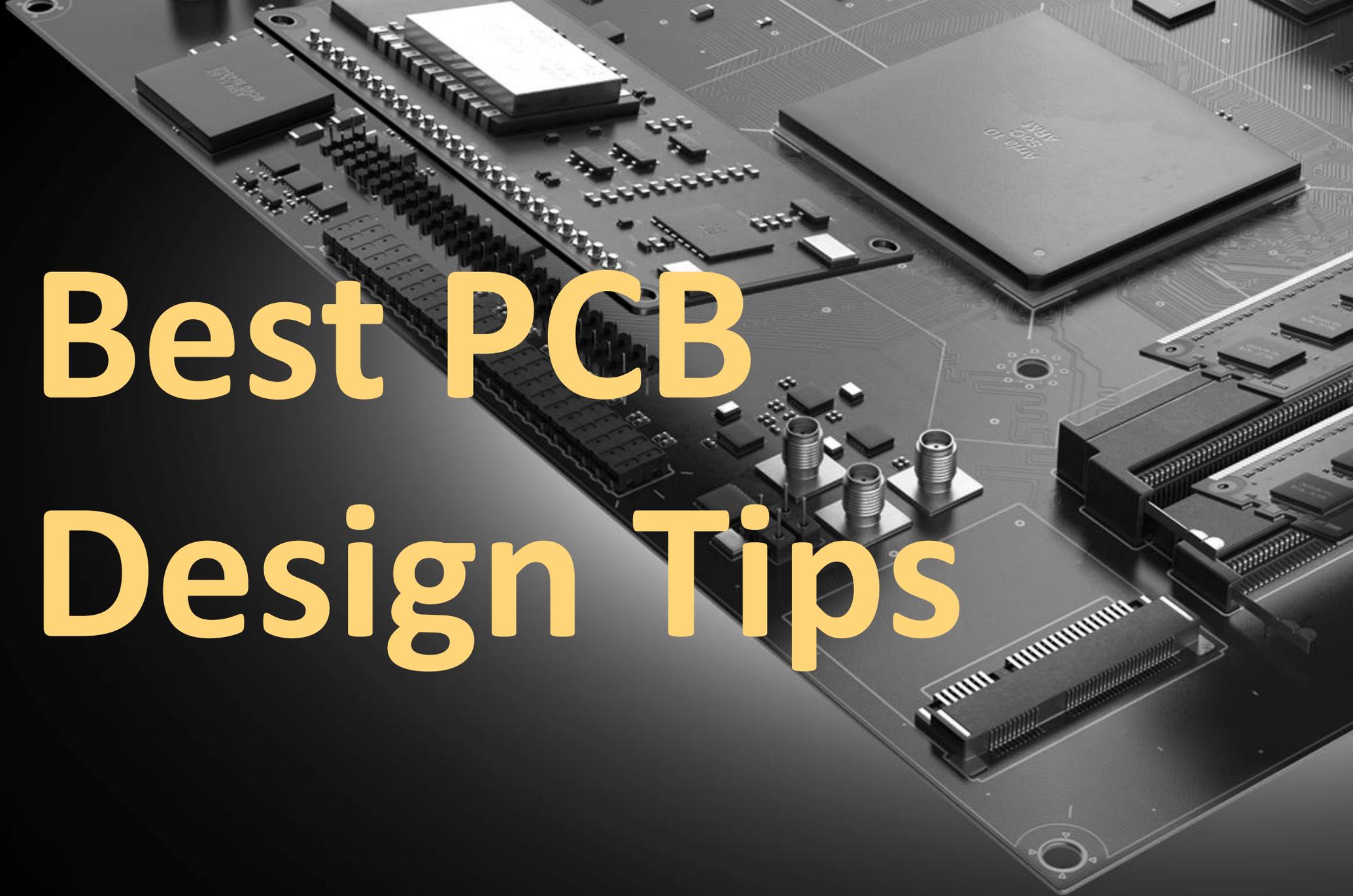


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# Best PCB Design Tips



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2. [ESSENTIAL PCB DESIGN TIPS FOR IMPLEMENTING A WATCHDOG TIMER IN PCB DESIGN](#)
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**1**

## **Tips on PCB Moisture Protection For Humid Environments**

# PCB Moisture Protection for Humid Environments

A common problem caused by humidity is the formation of water droplets on electronics, particularly PCBs since it corrodes the copper traces. Condensation on a powered PCB can cause short circuits and damage to other components

Some best practices to prevent humidity from damaging embedded systems:

- **Conformal Coating And Enclosure** - Apply the conformal coating and place it into an enclosure for keeping your electronics safe from moisture. The downside is that rework on the PCB can be difficult.
- **Suction Fan** - Installing a fan that sucks the air out from the casing can help in reducing the humidity.
- **Silica Gel** – Placing a pack of silica gel with PCB can help in reducing the moisture content in the air.
- **Heating Elements** - Turning embedded system into an intelligent mini heater can be an effective way to solve moisture problems.



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**2**

## **Tips for Implementing a Watchdog Timer in PCB Design**

# Tips for Implementing a Watchdog Timer in PCB Design

When the WDT fails to operate, a stalled microcontroller will remain stalled and cause the embedded system remains down. Here are the ways to avoid it:

- Why Embedded Systems Failed To Recover Despite Having A WDT** - The WDT is a simple fail-safe feature in electronics. It is programmed to countdown over a set time interval. This simple feature compensates for design errors or environmental factors that may cause a microcontroller to crash.
- Why a WDT Might Not Operate Properly** - For embedded systems using an internal WDT, runaways code can deactivate the WDT if the configuration bits are unintentionally overwritten and because of coding errors. If the functions that refresh the WDT timers are placed in the wrong part of the program, they won't operate.
- How To Ensure The WDT Is Functioning Reliably** - Ensuring that the WDT does its job involves the firmware developer, system installer, and the hardware designer. The structure of the program should be drafted out so that the WDT is refreshed at appropriate locations in the program.



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**3**

## **Standard Vs. Specialized Component Selection Tips**

# Standard vs. Specialized Component Selection

In electronics, the components used in circuits will influence the success of the design in its intended application. Some approaches that determine which components will be best suited to the design's intended application.

- **Standard and Specialized Components** - Standard components are readily available, they are often more affordable, and their reliability is a known quantity based on many years of test and analysis. On the other hand, one specialized component can often replace multiple standard components.
- **Specialized components become standard over time** - Over time, some specialized components will evolve into standard components. It's important to keep an eye on the market in order to stay competitive.
- **Rules, Regulations, and Choices** - Designs for military use, require certain components to have reliability specifications. Components in this design have an effect on the reliability rating of the entire assembly, which must meet certain overall criteria. Component selection in these situations is critical for meeting the basic design requirements.



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**4**

## **PCB Design Tips for including an external Watchdog timer in Board Design**

# Tips for including an external Watchdog timer in Board Design

A watchdog timer (WDT) is an electronics feature that is used to detect anomalies in embedded systems and reset the microcontroller. The microcontroller consistently refreshes the value of the timer to prevent it from entering the reset state.

## Internal WDT Vs External WDT

- Internal WDTs are watchdog timers built within the microcontroller itself. External WDTs are physical integrated circuits (IC) and require passive components to function.
- The advantage of choosing an internal WDT over its external counterpart is that you save money by minimizing the cost of additional components and can have a smaller PCB.
- It is always safer to place an external WDT on top of the internal ones.
- Errors can result in a system crash, which can be problematic in applications that have no tolerance for downtime. When this happens, systems equipped with a WDT will reset automatically.



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