mitai
by TDK

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SCAN ME

Buck converter
Input: 9V - 24 V
Output: 5V @ 350 mA

Before MITAI

Highly Likely

Detection

The I/O connectors have no protection elements. In case of an overvoltage or an ESD event, the components will be irreversible damaged

Recommendation

Add protections such as Transient Voltage Suppressors (TVS). They will increase the board against Electrostatic Discharge (ESD) and transient events.

Highly Likely

Detection

There are no input filters. External noise, both common-mode and differential mode, will be coupled within the board, affecting its functionality.

Recommendation

Add common-mode and differential filters. It will reduce the impact of external noise and the noise generated by the board over the power line

Somewhat likely

Detection

The capacitors are only ceramic, which do not have enough Equivalent Series Resistance (ESR) to keep the regulation. It can provoke unstability and noise.

Recommendation

Add one electrolytic capacitor with an ESR value according to the manufacturer's specifications. It will regulate the output and reduce the noise and ripple.

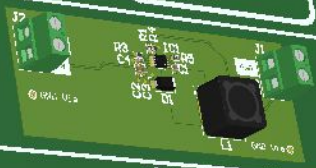
Highly Likely

Detection

The ground planes on the top and bottom layers are connected through just vias that are far. The high-impedance connection will provoke ground bouncing and instability in the power lines.

Recommendation

Add vias uniformly distributed, separated 3 – 5mm. It will reduce the impedance of the return path, reducing noise and ground bouncing. It will also reduce radiated emissions.



Highly Likely

Detection

The output capacitance is very low. The voltage ripple will be high, provoking noise over the power line.

Recommendation

Increase the output capacitance so the voltage will have less ripple. It will improve the power stability and reduce ground bouncing.

Highly Likely

Detection

The surface of the switching node is high. The fast dV/dt will provoke radiated emissions and impact the functionality of the converter.

Recommendation

Move the diode and the inductor so the surface is as small as possible. If possible, use smaller packages. It will reduce the unintended emissions.