L&T Technology Services

A Medical Power Supply, Re-Architected

90 percent lower cost. EMC cleared at design level.

CASE STUDY



engineering intelligence

EXECUTIVE SUMMARY

A global MedTech OEM was one test away from shipping. Its medical grade power supply kept throwing a false buzzer indication at the EMC bench under conducted and radiated immunity, leaving a Class II (FDA) and Class I (EU MDR) device short of the certification it needed to reach patients. LTTS rebuilt the electrical architecture from first principles and carried it from concept to manufacturing transfer, clearing full IEC 60601-1 and 60601-1-2 compliance while cutting product cost by 90 percent.

CLIENT CHALLENGE

A false buzzer indication at the EMC bench is an unshippable failure mode. No certification, no launch, no revenue, and every downstream date slides with it. Redesigning the failing board would have moved the symptom, not removed it: the pulse width modulation generating circuit sat outside the power supply, creating noise coupling paths shielding could not contain. All the while, the OEM was squeezed from three directions at once, miniaturization, patient safety and cost. They did not need a fix. They needed a rebuilt electrical architecture that would clear compliance cleanly and open commercial ground the product could not previously reach.

ENGINEERING COMPLEXITY - WHY IT WAS HARD

EMC failures are rarely where the test report points.

01

The noise path was architectural, not local. With PWM generation outside the supply, switching noise had a route shielding could only attenuate. Closing it meant moving a function across a boundary, which resets the thermal, layout and isolation picture at once.

02

Immunity testing punishes assumptions. It applies energy the designer did not choose, in a coupling mode the designer did not plan for. A layout that passes emissions can still fail immunity, and it surfaces as odd behavior rather than a clean fault.

03

Cost and compliance pull opposite ways.
Every conventional route to EMC margin adds filtering, shielding and copper. A 90 percent cost reduction meant the savings had to come from architecture, not component substitution.

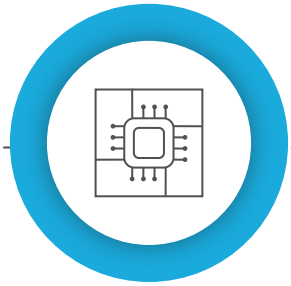
04

Usability set the envelope.
The device had to work one handed, which fixes the mechanical boundary before the electronics get a vote on separation.

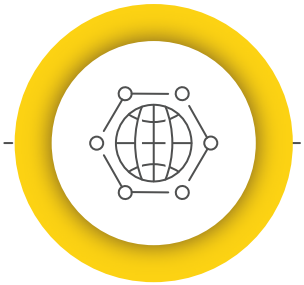
OUR SOLUTION



Architecture rebuilt around the noise source:
PWM generation was brought inside the power supply, removing the coupling path at its origin.



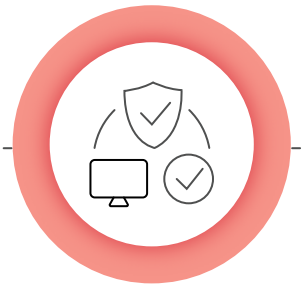
PCB stack up engineered for immunity:
Stack up, return paths and separation designed against the failure mode, so compliance became a property of the design rather than the shielding budget.



CM qualification across four geographies:
India, USA, Mexico and Singapore, so the OEM ended the program with sourcing flexibility, not a single dependency.



Industrial design for single hand operation:
Enclosure and interaction model engineered alongside the electronics, keeping usability out of late stage compromise.



PCBA, tooling and product qualification:
Developed and qualified with the CM, so transfer did not become a second engineering cycle.



DVT owned end to end:
Protocols, execution and reporting for functional, transit (ASTM D4169 and F2825), wipe and one year equivalent reliability testing, structured for regulatory submission.

BUSINESS OUTCOMES

90% lower product cost, from removing an architectural workaround and its mitigation hardware, which is why compliance improved at the same time.

Full IEC 60601-1 and 60601-1-2 compliance, with the buzzer fault eliminated at design level rather than suppressed.

Four geography CM footprint qualified, giving the OEM sourcing resilience and negotiating position.

One year equivalent electrical life validated, alongside ASTM transit qualification, so reliability claims sit on executed protocols.

Beyond the numbers, the OEM walked away with a sleeker one handed device, a submission ready verification dossier, and a manufacturing partner already qualified.



This collateral includes AI-enhanced imagery

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ENGINEERING THE CHANGE

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