

### Customer

Russian developer of GSM car security systems.

### Objective

At the customer's request, an audit of the car GSM alarm board was performed and a set of recommendations about the product was developed to reduce risks at the mass production stage.



A controller board audit involved the following tasks:

- A comprehensive analysis of the selected architecture, circuit design and PCB design
- Development of test software for production stage
- In-depth analysis of the developed board, based on the supplied documents and the manufactured samples
- Calculation of the maximum operational time from battery source
- Development of production test recommendations for the product

The main objective of the analysis was to ensure uninterrupted operation of the board for an extended period of time.

### Solution

The project tasks were fulfilled by applying the following solution:

- Analysis of the product's selected architecture:
  - Analysis of the selected CPU for operational speed and power consumption compliance
  - Analysis of the selected external interfaces
- Analysis of the product's principal circuit:
  - Analysis of the feed circuit on an external and internal battery source
  - Circuit components connection analysis
  - Analysis of the external environment protection implemented on the external interfaces
  - Analysis of the implemented methods for safety and electromagnetic compatibility compliance
- Calculation of the minimum battery run time:
  - Theoretical calculations based on power consumption data from the components documentation



- Calculations based on the practical electrical measurements of the controller board
- PCB design analysis:
  - Analog components and feed circuits trace analysis
  - Digital components trace analysis
  - Solder pad and mask compliance analysis
  - GND conductors distribution analysis
  - Static protection, safety and electromagnetic compliance analysis
- Real conditions electric measurements in PCB characteristic points
- Functional testing:
  - Development of production test methods
  - Development of self-diagnostic production test software
- Production test methods analysis to detect manufacturing defects with the highest probability
- Compilation of an audit report containing analysis results and reliability enhancement recommendations

### Outcomes

- The selected multi-parameter analysis strategy helped ensure the end product's high quality
- A highly effective analysis was achieved through involving qualified experts with an extensive experience in related areas
- A number of defects were identified in the process and a set of defect correction recommendations was developed, which helps cut the manufacturing and operating expenses

Efforts	2 man-months
Project duration	1.5 months