# RAIL COMPUTING SYSTEM GAINS MORE POWER AND FLEXIBILITY WITH RECOM 60W CONVERTER

## CHALLENGE:

- To upgrade the rail computing system with more power for additional sensors and a more powerful processor while still conforming to the original -40°C to +75°C operating temperature range
- New system must fit into the same chassis, as the mechanical construction of the train is fixed

## SOLUTION:

- 60W converter, smaller than a legacy 40W solution but still compliant with legacy RIA12 specification and temperature range
- Baseplate-cooled power supplies make heat management easier
- Easy to deploy, off-the-shelf, surge-protection module

## APPLICATION:

- Input voltage range must cover all rail applications from 72V up to 110V nominal, including legacy voltage transients
- Converter input range from 40 – 160V needed with EN 50155 compliance
- Surge protection for RIA12 and NF F01-510 transients also needed (up to 385VDC)
- Output voltage of 5V, 12A supplies power to the CPU board and interfaces
- Isolated 1W DC/DC converters for interfaces need a 6kV isolation barrier

## TEASER:

In modern trains, more and more electronics are installed to comply with safety regulations, replace mechanical solutions or increase passenger comfort. However, space is limited, and new, more powerful features must fit into the existing housing of the previous solution while still meeting the original legacy requirements. Even more challenging for the railway power supply is the requirement to deliver more power in less space. See how RECOM solved this challenge for a customer.

## STORY:

Although not visible to the passengers, modern trains need a lot of electronic equipment to comply with increased safety and communication requirements, which enables them to handle numerous complex functions within the train control systems easily, as well as offer more comfort and information to the passengers.

This requires increased computing power, more sensors, and higher communication transmission speed, all of which results in increased demand for power from the power suppliers. However, space is limited, and the mechanical construction of a train cannot be changed easily. Quite often, new systems are required to fit into the existing small space allocated to a significantly less powerful legacy system designed years ago.

A customer faced the above challenge while upgrading an existing central computing unit by adding a more powerful CPU and additional interfaces to the system. The old system required 40W of power, where as the new unit needed 60W; in addition to this, it required more space on the PCB to accommodate additional and more powerful, interfaces.

Increasing the power by 50% also means more heat and thermal stress in the system, although the operating temperature limit (+75°C) remained the same. Optimized thermal management, in conjunction with a reduction of dissipated losses in the power system, became important factors.

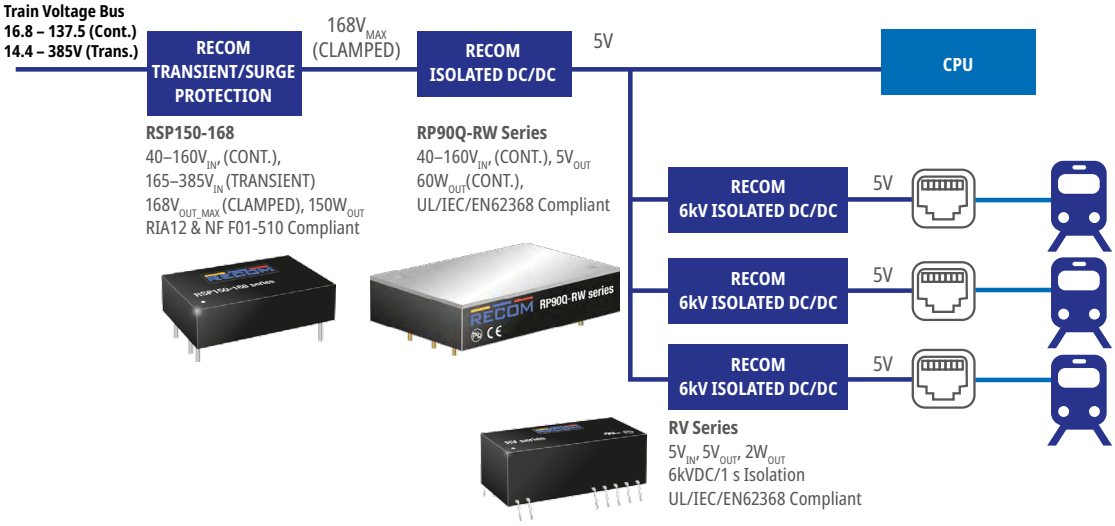
The customer also wanted the system to work seamlessly across all the different train voltages from 72 to 110V nominal (40 to 160V continuous operation with EN50155 compliance) with a protection against the high transients defined in RIA12 and NF F01-510 of up to 385VDC. The legacy power system was not able to deliver 60W without taking more space on the board, and losses in the conversation stage would have been prohibitive for the new design.

With a tiny 60W converter and a transient protection module from RECOM, it was possible to address all these challenges. The converter was even smaller than the previous 40W unit, which freed up space for additional interfaces, and the modern, highly-efficient technology of the converter helped to reduce losses significantly. This converter uses a baseplate for cooling, so it was possible to move the heat out of the system and onto the chassis of the computing unit.

In addition, the small transient protection module took up less space than the previous, discrete solution and ensured that the downstream, 90W DC/DC converter is protected against the high transients of the train grids. The final challenge was the high-isolation barrier of 6kV requested for the 5V interface supplies. RECOM solved this as well with small 2W converters which offered this isolation.

For a lower power solution, the customer can use a 40W sister part with the same qualification data but reduced maximum power and output current.

## DIAGRAM: RAILWAY COMPUTING SYSTEM

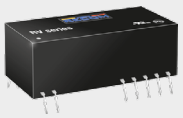



## PRODUCTS:

### Main, Isolated 5V


### Transient Protection

### Isolated, 5V Peripherals



| | RP90Q-11005SRW | RSP150-168 | RV-0505S/P |
|---|---|---|---|
| Input | 40–160V | Surge Protector | 5V |
| Output | 5V | RIA12 and NF F01-510 compliant | 5V |
| Power | 90W, max., 60W continuous | 150W | 2W |
| Size | Quarter Brick | 1.6x1“ | DIP24 Mini |
| Isolation | 3kVAC / 1 min | - | 6kVDC / 1s |

## PRODUCT BENEFITS:

### RP90Q-RW SERIES:

- A wide, continuous input voltage range of 40 – 160V, with up to 385V surge protection with the RSPxx-168 module
- Up to 90W peak power
- Industry leading efficiency up to 90%
- Baseplate-cooling and mounting, which means
  - easier heat management
  - secure mounting in high-shock-and-vibration environments

### RSP-168 SERIES:

- A surge protector (voltage clamp) for RIA12 and NF F01-510 transients
- Output following input up to the clamp voltage
- Max. load = 20W, 150W, or 300W
- -40°C to +95°C operating temperaturerange
- Board-mount module

### RV SERIES:

- UL/CSA/IEC/EN safety certivication and CB report
- 6kVDC/1s isolation
- Optional continuous short circuit protection
- Efficiency up to 82%
- A space-saving package
- Very low isolation capacitance
- Suitable for IGBT application

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