

High Reliability DC/DC converter module for electronic boards equipped with FPGA

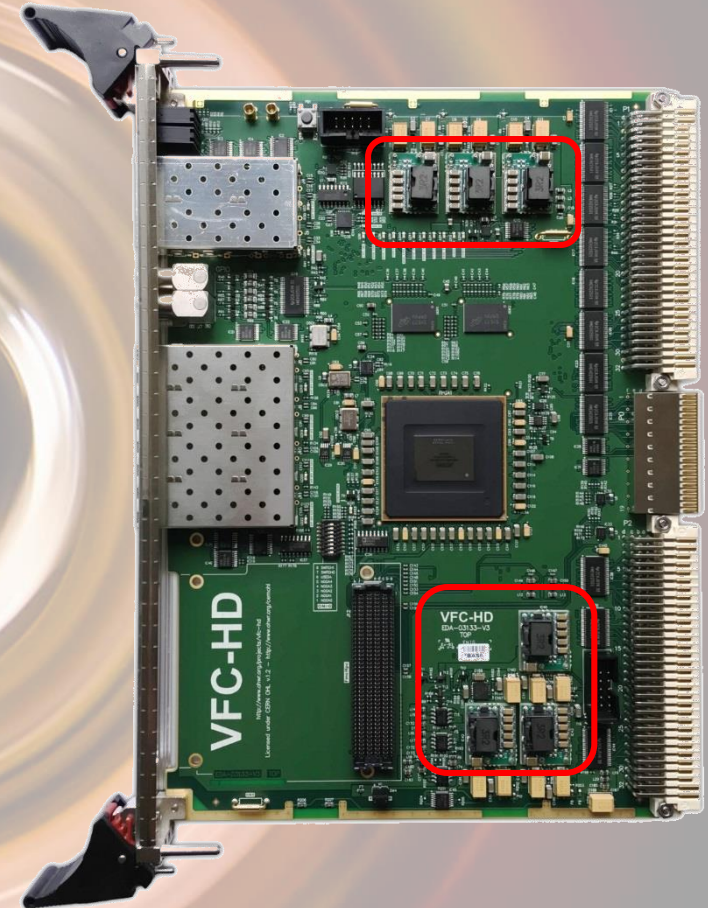
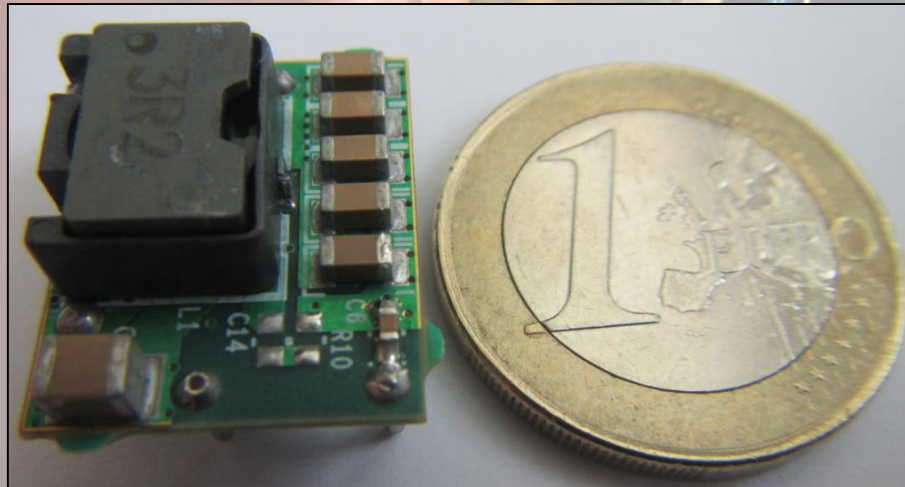
CERN,
26th October 2018

Meet the Hi-Rel DC/DC

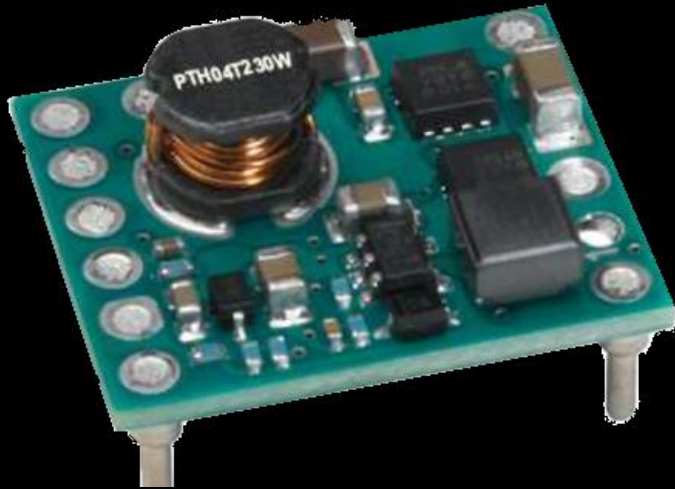


The Hi-Rel DC/DC is the easy way to generate all required step-down voltages for digital electronic boards.

Specifically targeting high reliability and very long life expectancy systems.



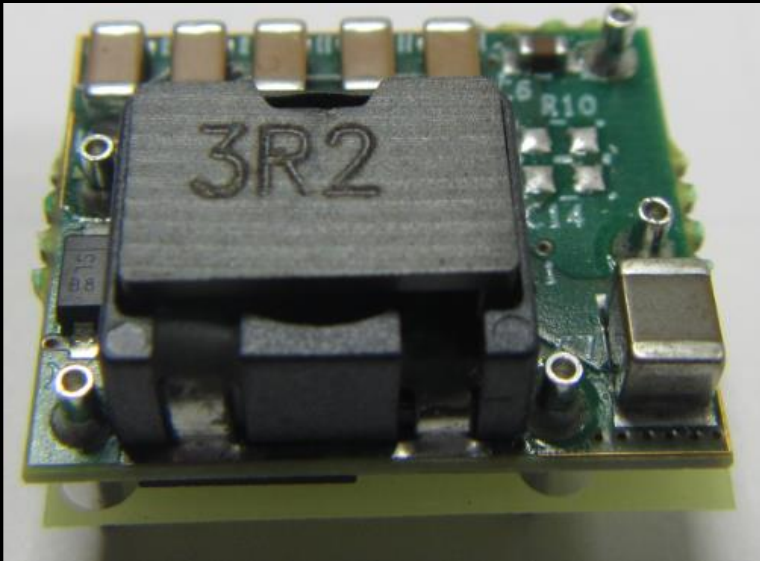
The problem: limitation of commercial modules



PTH04T230W from Texas Instruments

- Unshielded inductor which **can be damaged** by cleaning processes; board handling and dust.
- Design at the maximum component performances (designed up to 6A at the **full components stress**).
- Impossible to modify the **copyrighted design**.
- Mounted as secondary board, **not directly integrated** into the board design.

The solution: Hi-Rel DC/DC

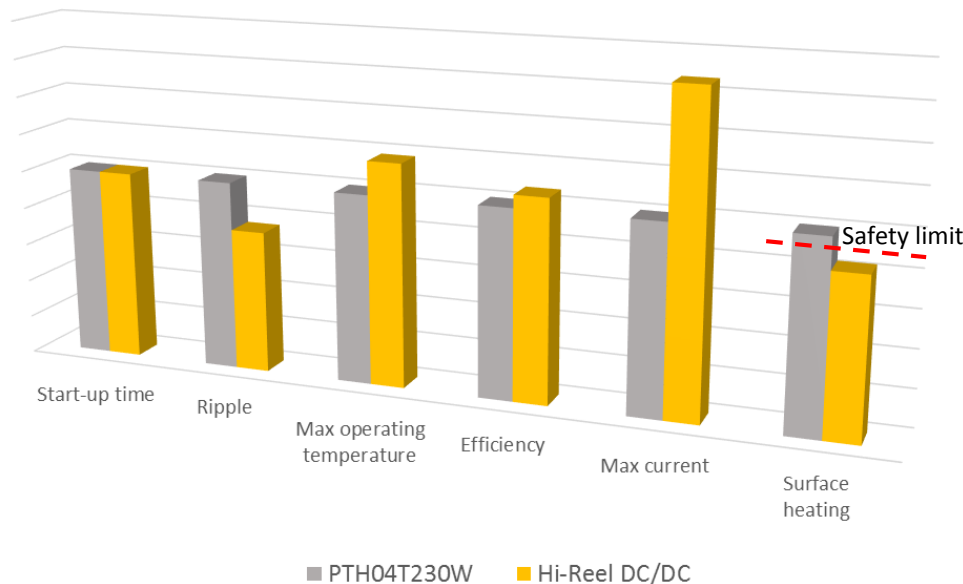


- Pin-to-pin compatible with Texas instruments' PTH04T230W module.
- Designed respecting the Military/Aerospace derating rules.
- Equipped with shielded inductor.
- Designed for long life requirements.

Performance comparison



Comparison between the commercial module and the CERN Hi-Rel DC/DC



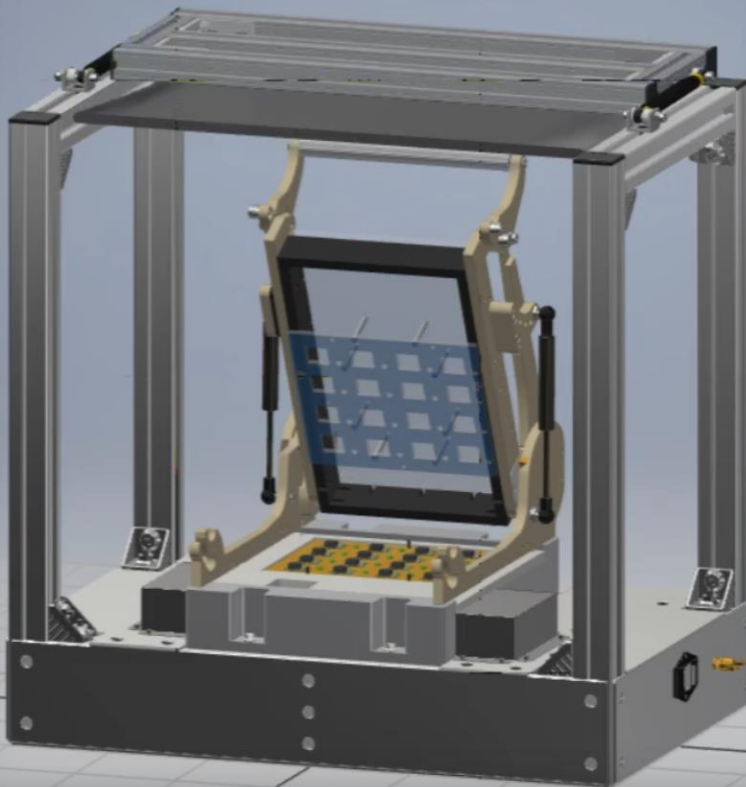
- Start-up time: **7ms**.
- Ripple: **< 40mVpp**.
- Max Operating temperature: up to **100°C**.
- Efficiency: **+6%** when **6Amp** are supplied to the output.
- Maximum current: up to **10 Amp**.
- Direct contact safety: **51°C** for 6Amp.

CERN Hi-Rel DC/DC Mean Time To Failure (MTTF)
> 1E+07 working hours
at 40°C calculated with the Military Handbook 217 plus

We have built an
efficient and reliable
DC/DC converter



What has been done so far?



2017

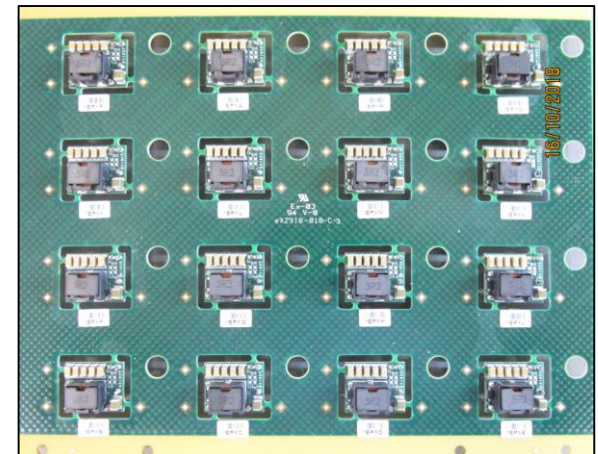
1000
pieces
produced,
manually
tested, and
integrated.

2018

6500
pieces are
under
production.
Automatic
test.

2018 - 2019

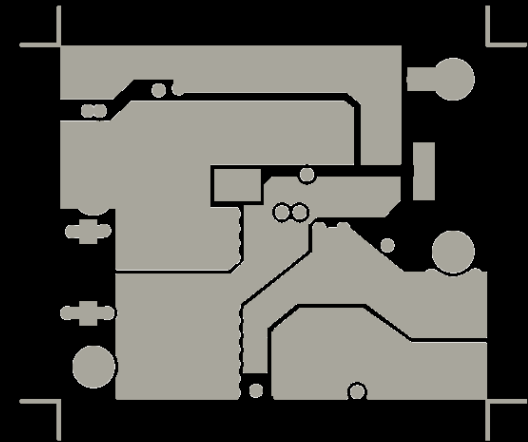
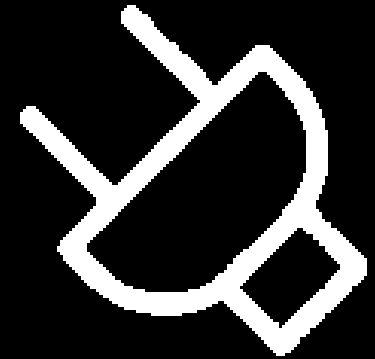
Assembling
with the
mother
board



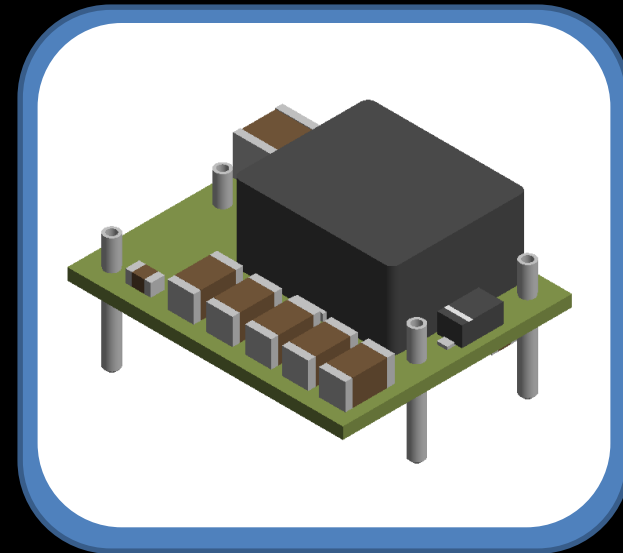
What do we gain by using the Hi-Rel DC/DC?



- 6% better efficiency at the maximum load can be translated as 1.88W/h of energy saved for each DC/DC, which correspond to 10.4KWatt/year.
- Lower loss of power means lower heating and longer life.
- The Hi-Rel DC/DC module can be used by commercial, industrial, railway and aerospace industries.
- The complete manufacturing documentation will be available to produce the complete module or to integrate the design into your boards layout. By doing that we can save about 5CHF per power supply.



- Replace pins to increase the distance from the main board. Else, an additional insulator is required.
- Adapt the **Hi-Rel DC/DC** to Aerospace / Railway industry:
 - Climatic qualifications.
 - Vibration tests.
 - Electromagnetic susceptibility and emission.
- **Proposed contacts:** Airbus, Boeing, ATR, Cassidian, Bombardier, etc..



Thank you for your attention!