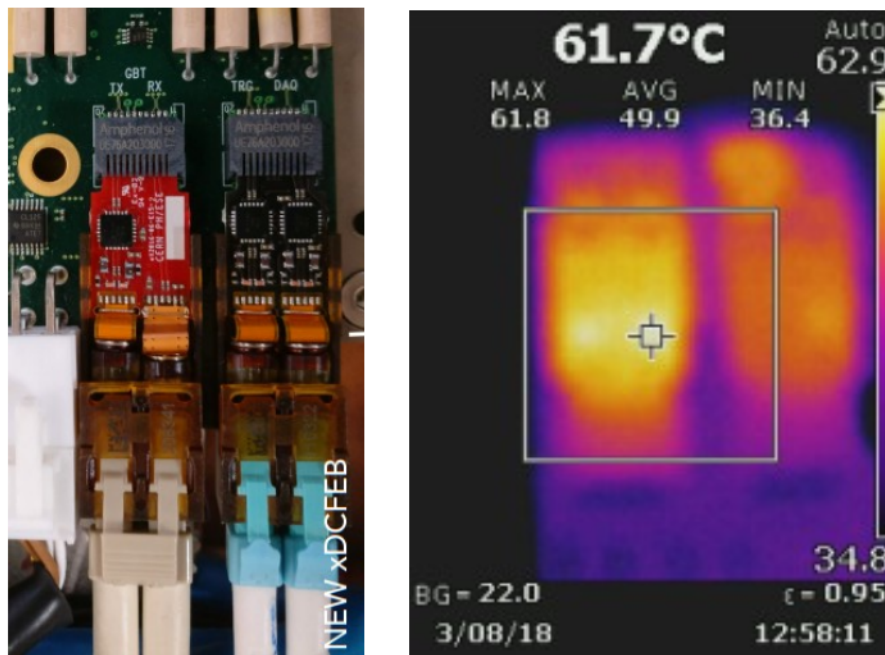


(x)DCFEB Cooling Covers

Yacine Haddad

VTTx is the new optical link that will be used by the new frontend electronics of the CSC sub-detector. These connectors come with a GBLD chip that was proven to reach an operating temperature above 65 °C without additional cooling. The following picture shows a thermo-camera measurement measuring a powered VTTx temperature (non-cooled) that can reach 62 °C.



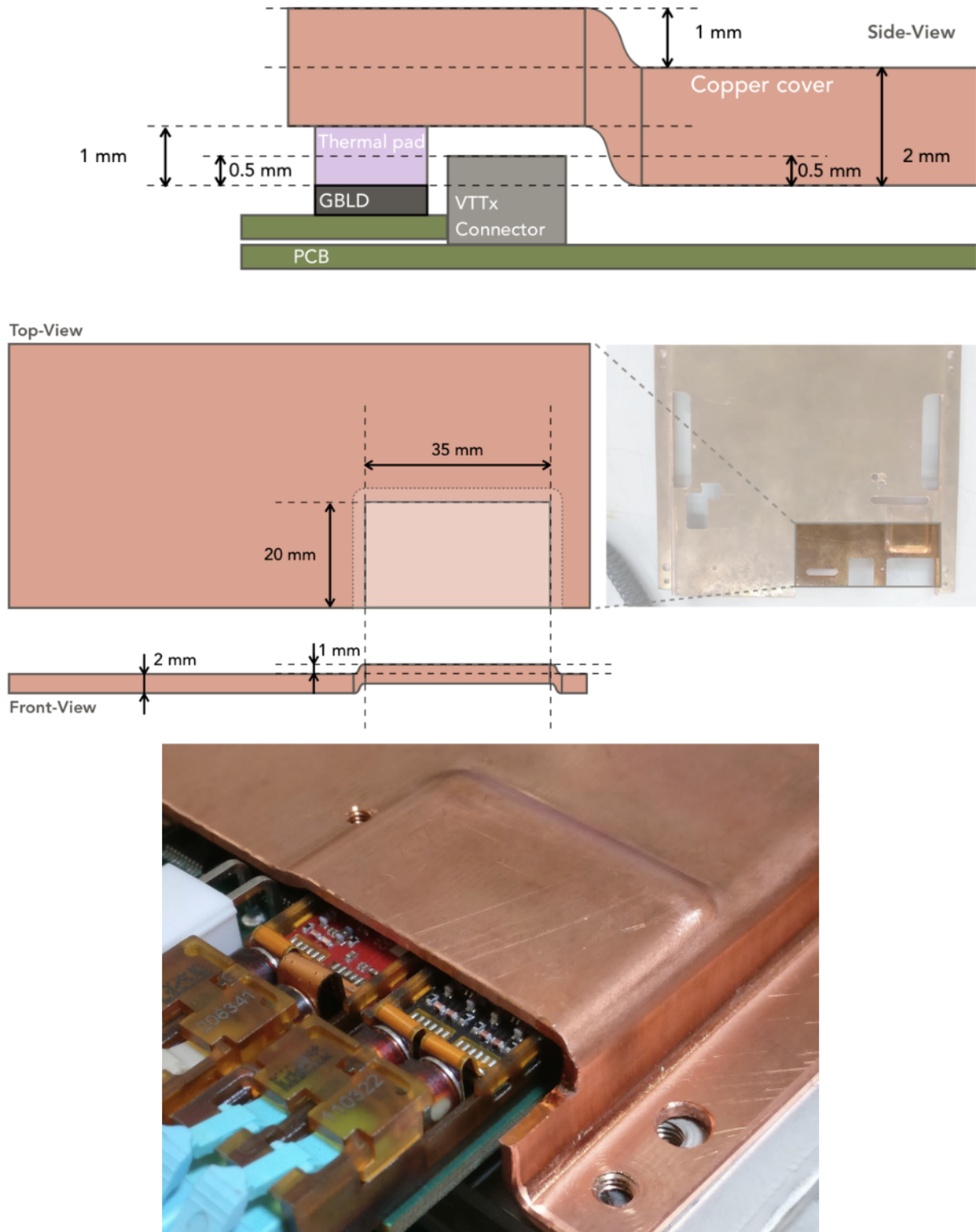
Several studies were conducted on the cooling of the VTTx adapters. Here we propose two cover designs, one for the DCFEB that will replace the CFEBS on the ME 2,3,4/1 chambers and another for the xDCFEB that will come with the VTTx connectors as default. These cooling solutions were explored and tested and the results are summarised below.

1. Proposed cover layout for xDCFEB-VTTx on ME 1/1 chambers

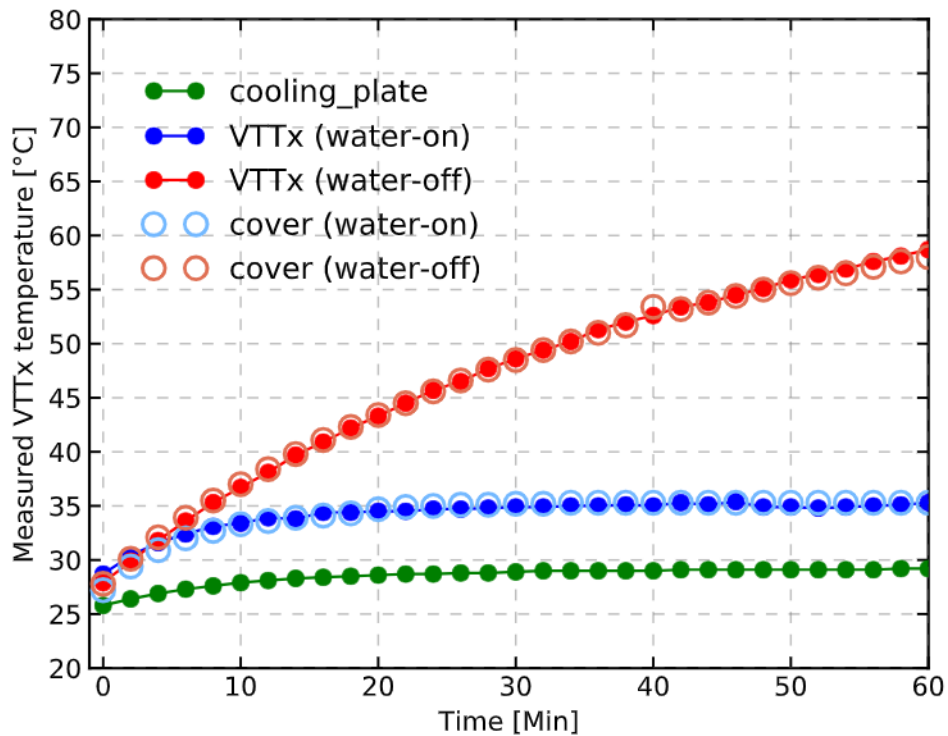
A new frontend board will replace the existing DCFEB on the ME 1/1 chambers. As these board will have a slightly different layout, new covers will need to be designed to cover the changes on the new board. They will have the same form factor as DCFEB covers with two exceptions:

- New cutouts need for the GBTx connector and the configuration selection jumper
- A deformation of 1mm high in a region of 35 x 20 mm, on the VTTx connector region.

The 1mm deformation is motivated by the need to have an effective cooling for the VTTx connectors. The design detail is the following:



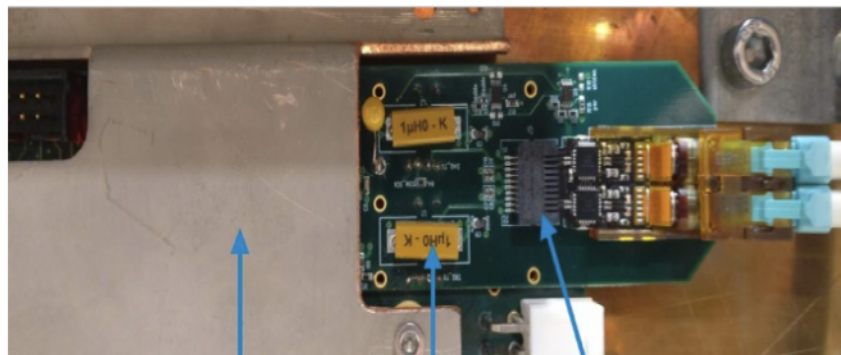
The new covers succeed in reducing GBLD operating temperature by more than 20 °C, stabilising it at 35 °C. Note that these temperatures have been done at B904 with a standalone chiller instead of central cooling delivered by the site. The operating temperature is expected to improve with the CMS central cooling.



504 covers will need to be produced to equip all xDCFEB on the ME 1/1 chambers. The old standoffs and crews can be reused for the new covers, the same mounting procedure can be followed. Extra 12 cm² of thermal pads is expected for the GBTx and the VTTx chips.

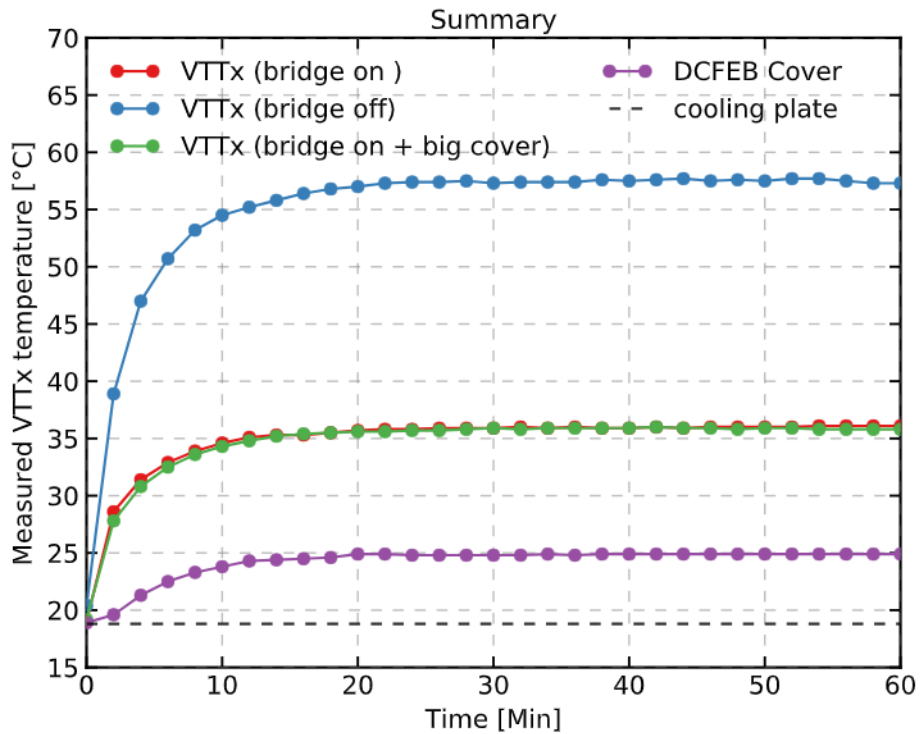
2. Proposed cover extension layout for VTTx adapter board for ME 234/1 chambers

The Finisars that currently equip the DCFEB's will desoldered and replaced by VTTx adapters as shown in the figure.

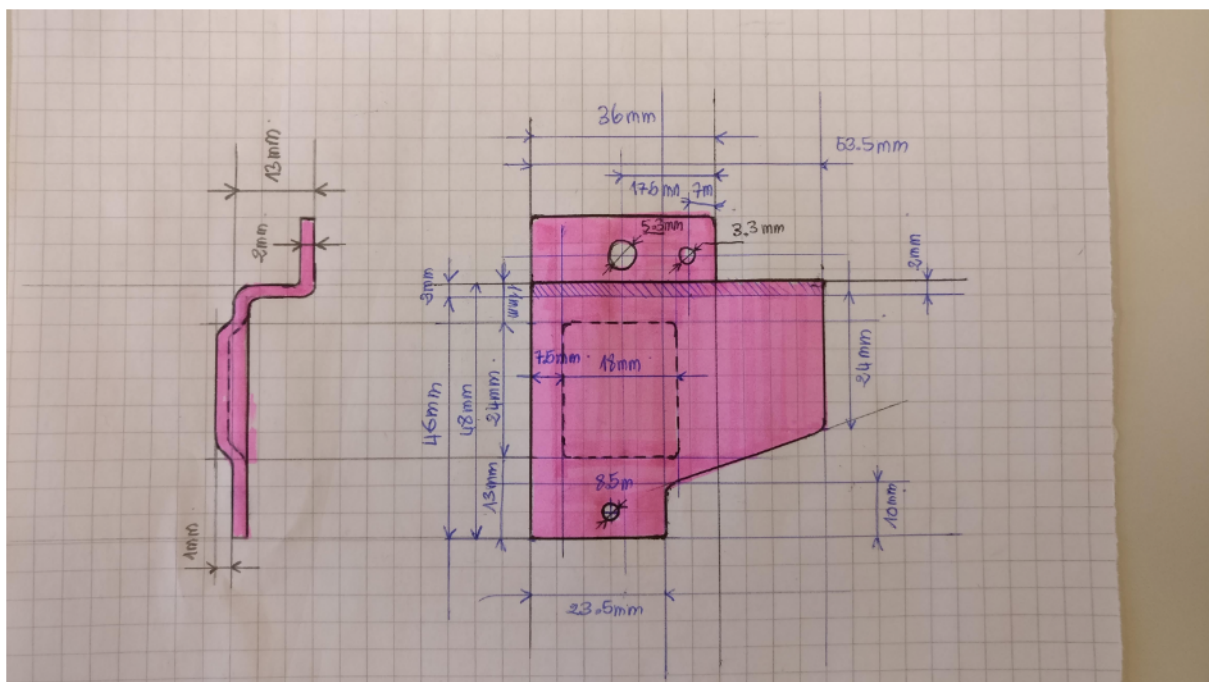


The CFEBS mounted on ME234/1 have a cooling covers, which will be reused on the refurbished DCFEBs. These covers do not reach the VTTx connectors chips (GBLD's), the additional extension will need to maintain a reasonable working

temperature. Several tests have been conducted on the VTTx using designs that use the existing threads and holes present on the covers. This will avoid any destructive work on a possible activated material.



The latest design showed to be effective on maintaining a VTTx operating temperature at 27 °C. The schematic of the cover extension is shown below.



This prototype uses two holes at the cover of the DCFEB covers to have mechanically stable extensions. The cover extensions itself will have a deformation of 1 mm in the centre to avoid conflict with VTTx inductors.

540 pieces will need to be produced to equip all DCFEBs of the ME 234/1 chambers. New standoffs will need to be designed or ordered with 4.5 mm height, 6 for every DCFEB, plus the 3 x 5 mm screws. A wider 4 x 5 mm screw will need to fix the extension to the cover.



In total 500 piece will need to be produced to carver all the DCFEB on the ME 234/X chambers.