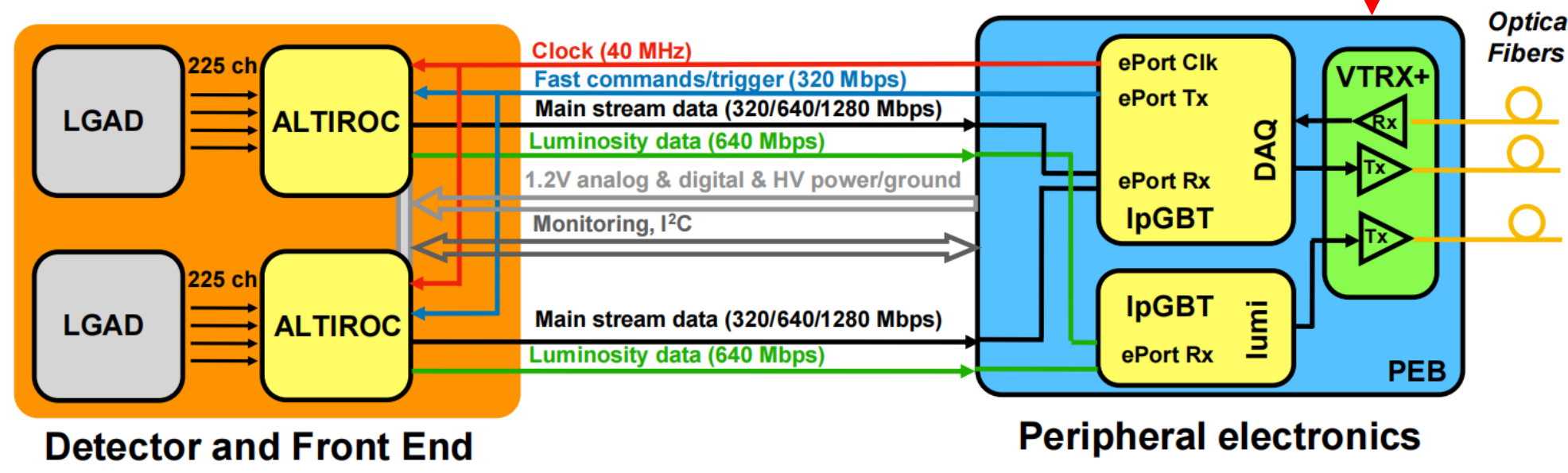
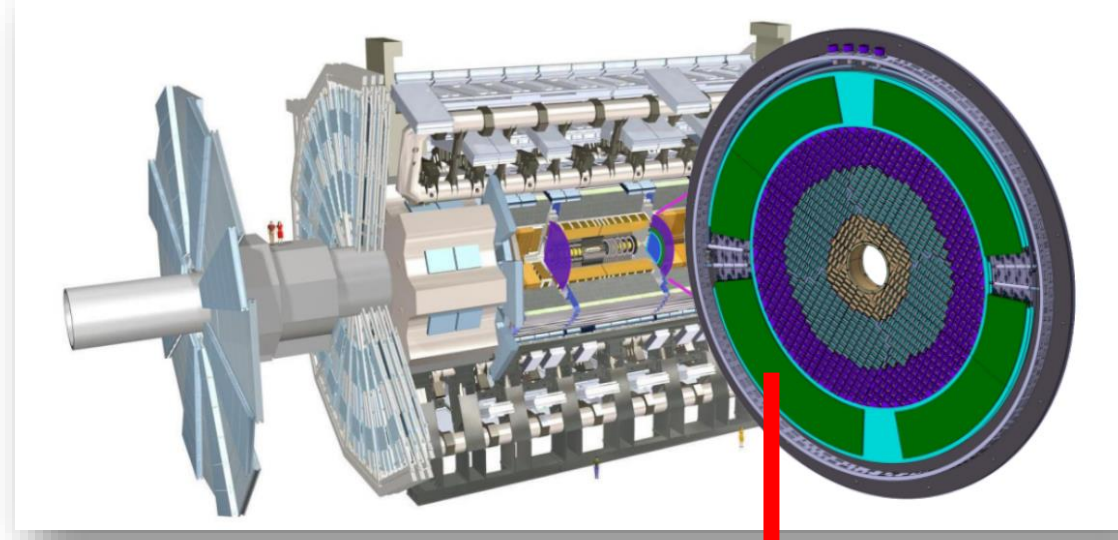




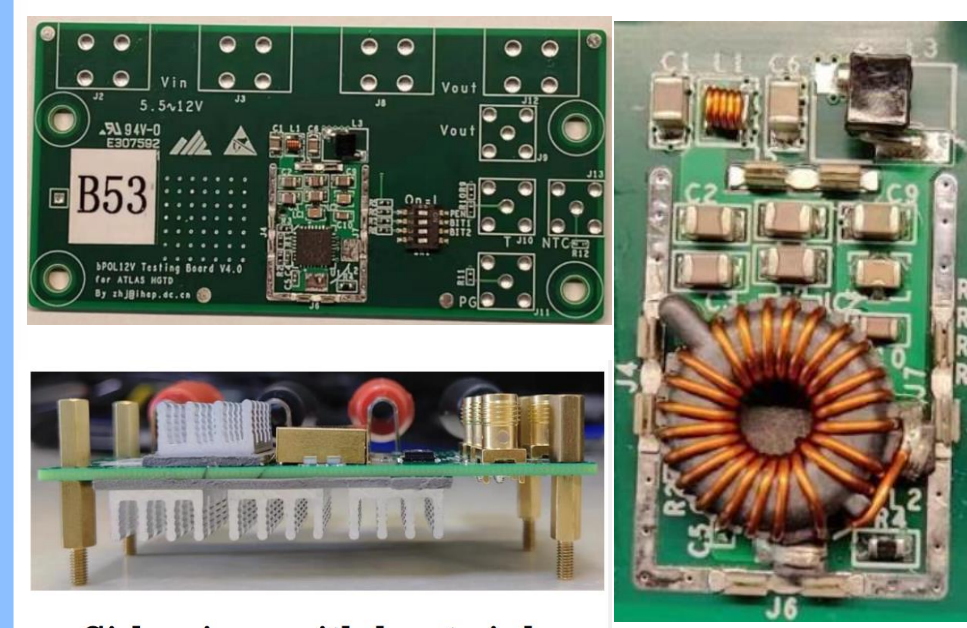
HGTD & PEB

- High Granularity Timing Detector (HGTD):
 - Aim to ATLAS Phase II.
 - Provide a time resolution of around 30 ps.



- Peripheral Electronics Boards (PEB) in HGTD:
 - Used for control, monitoring, data transmission, power-supply distribution, and temperature sensor routing for interlock system.

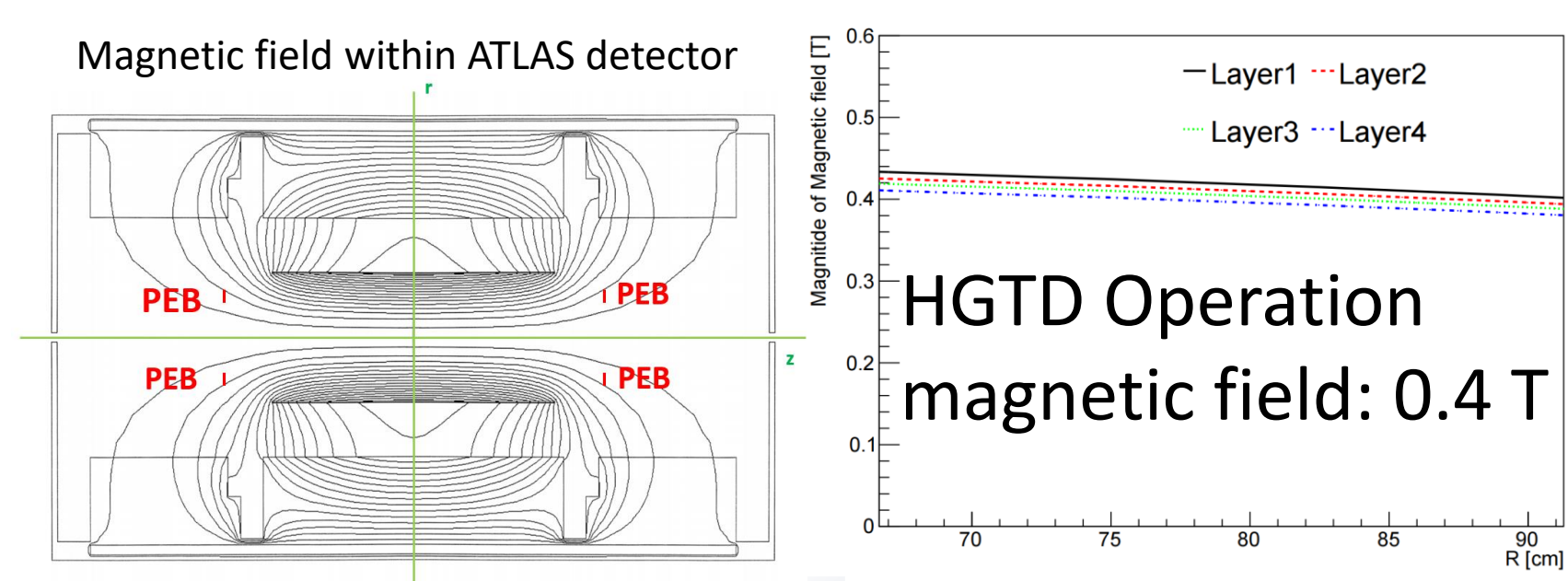
BPOL12V Power Block & Test setup



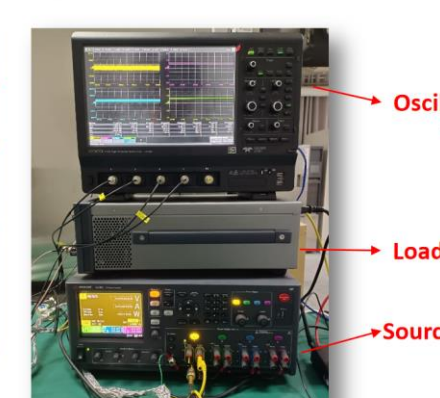
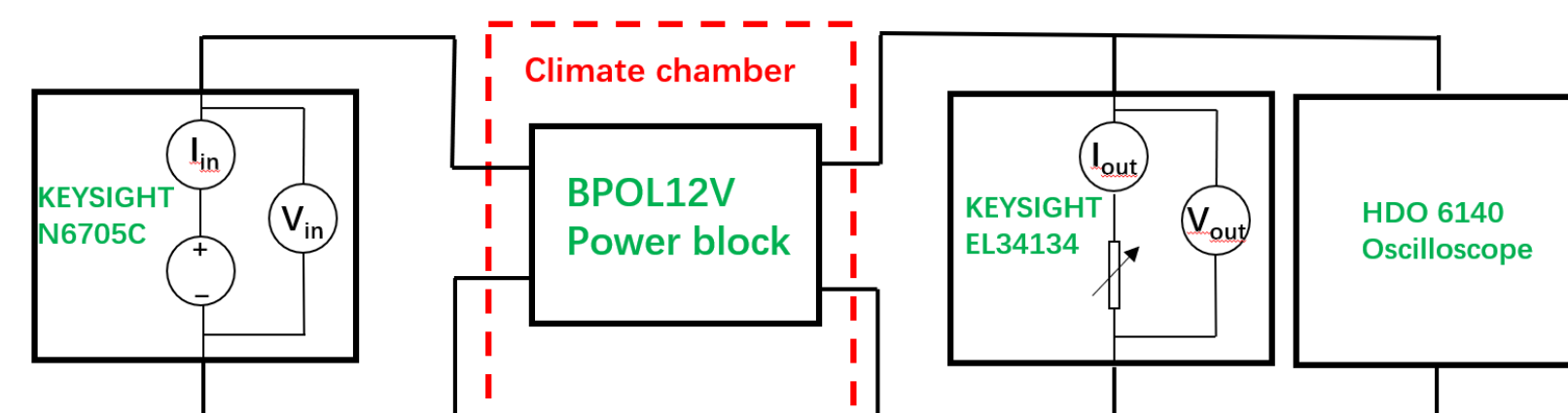
Side view, with heat sink

- BPOL12V Power Block in PEB:
 - DC-DC converter.
 - Generate 1.2 V and 2.5 V for the ALTIROC ASIC and other components.
 - Test of BPOL12V Power Block is crucial for PEB and HGTD operation.

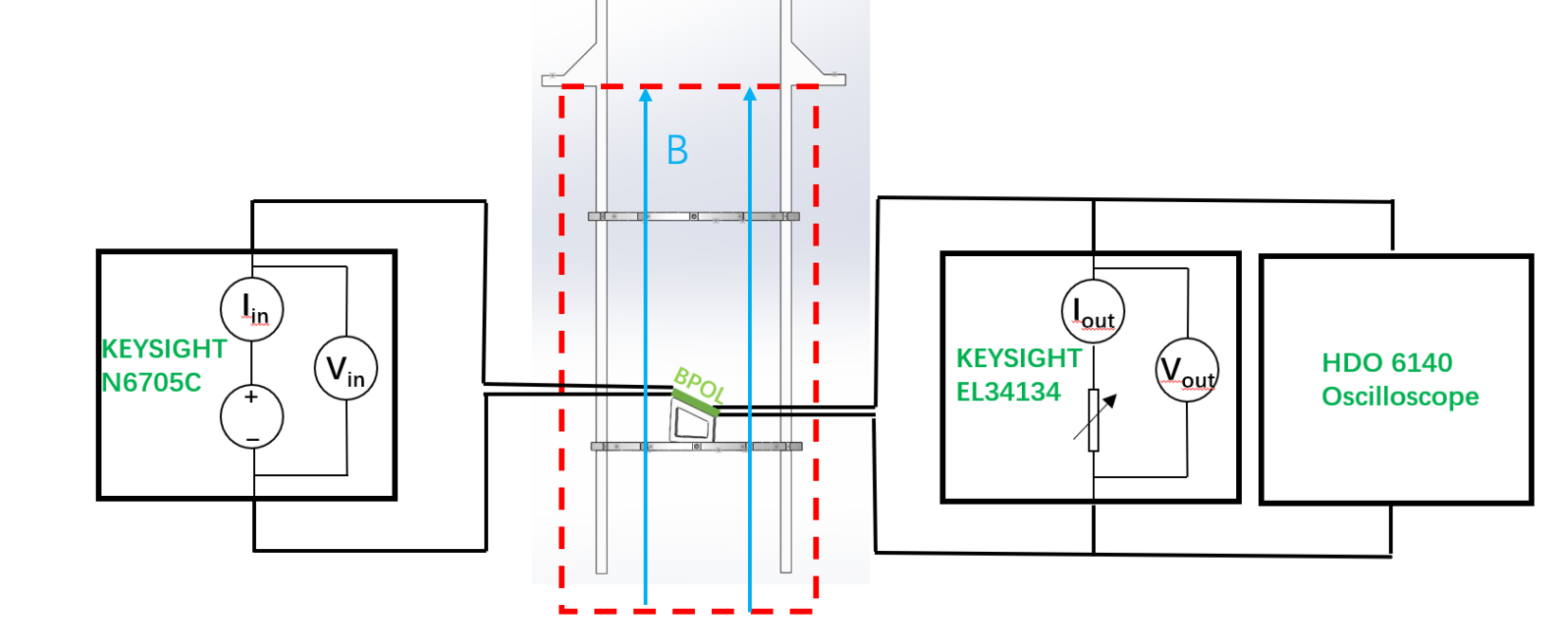
Test in magnetic field



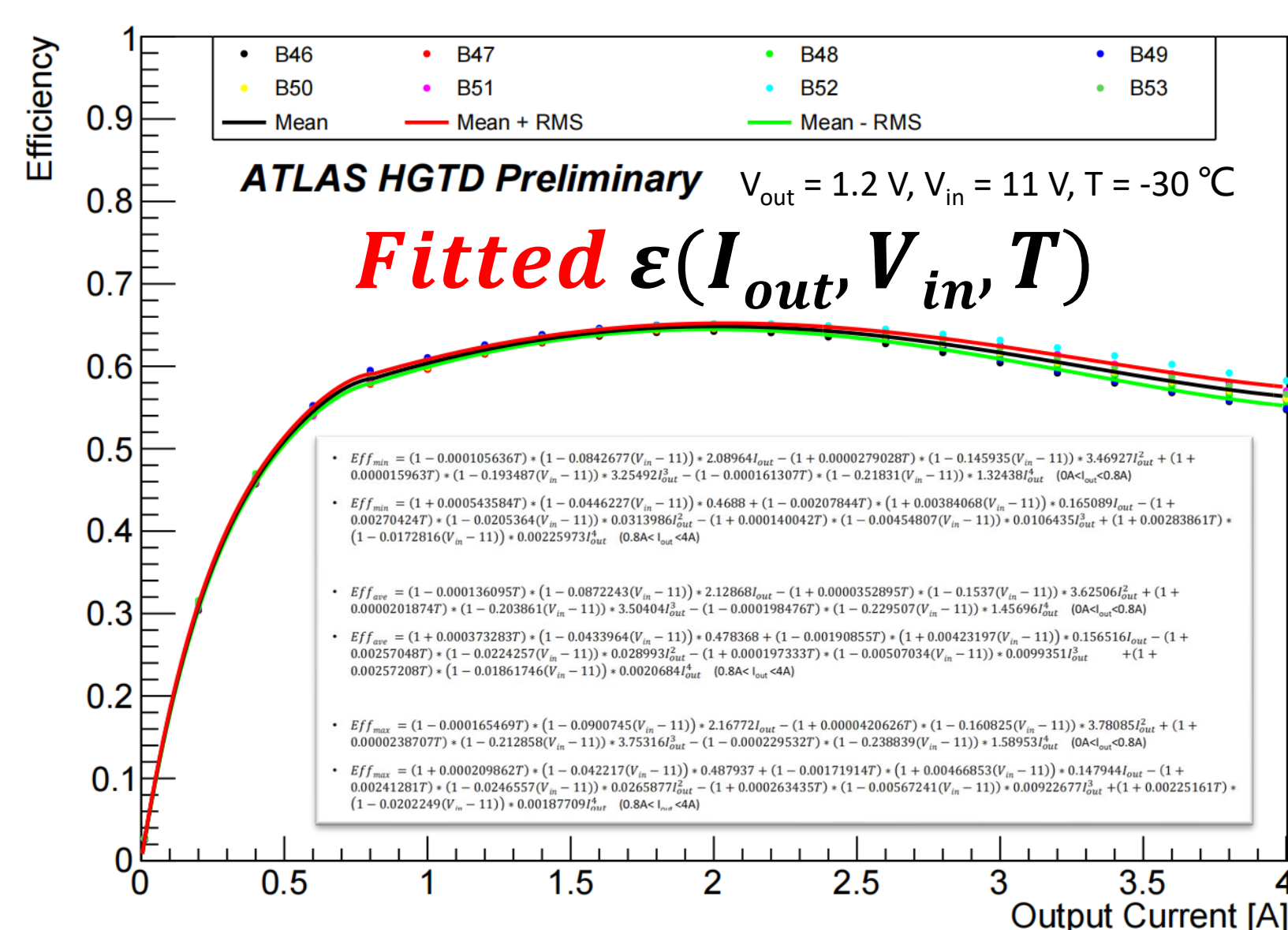
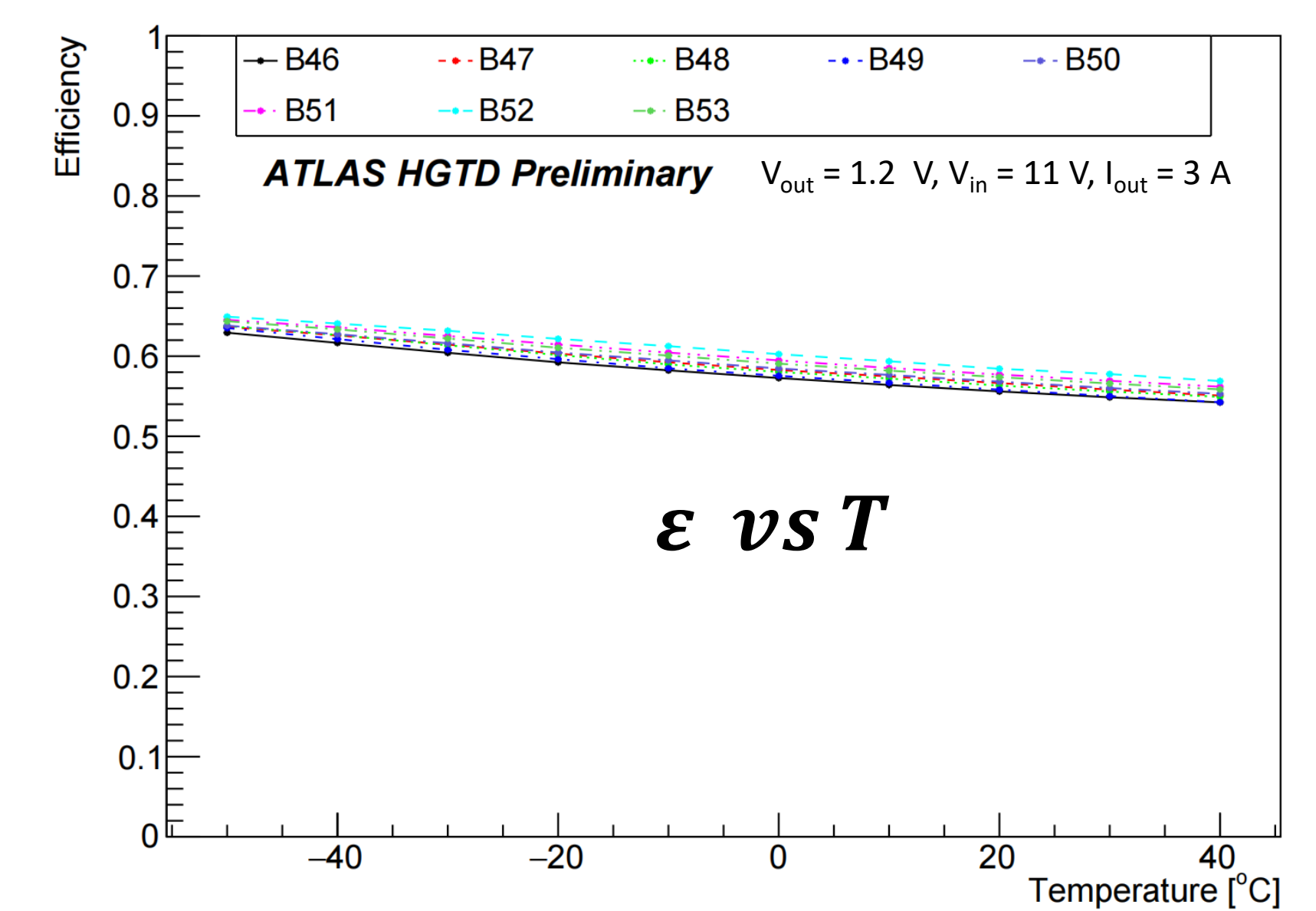
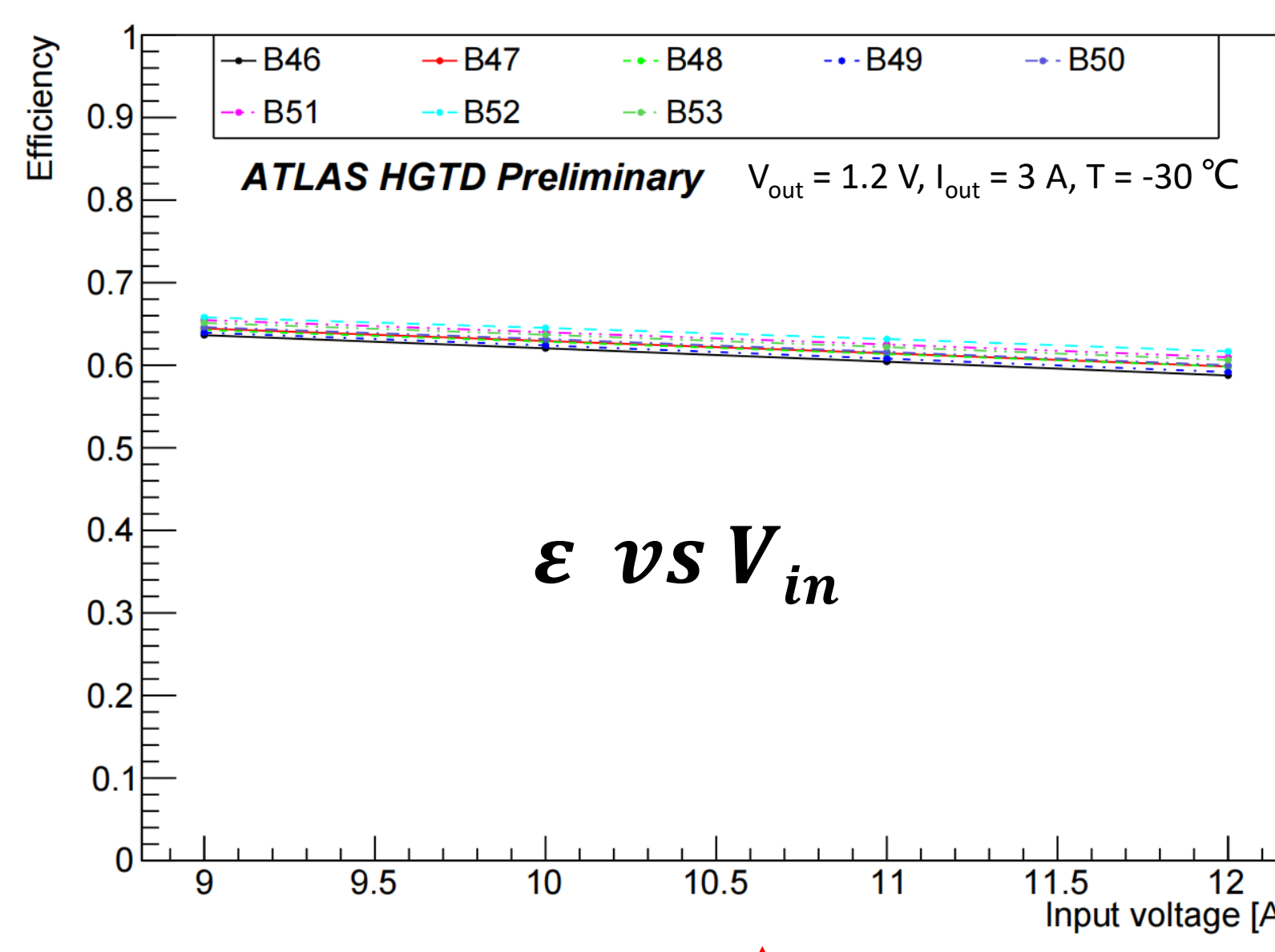
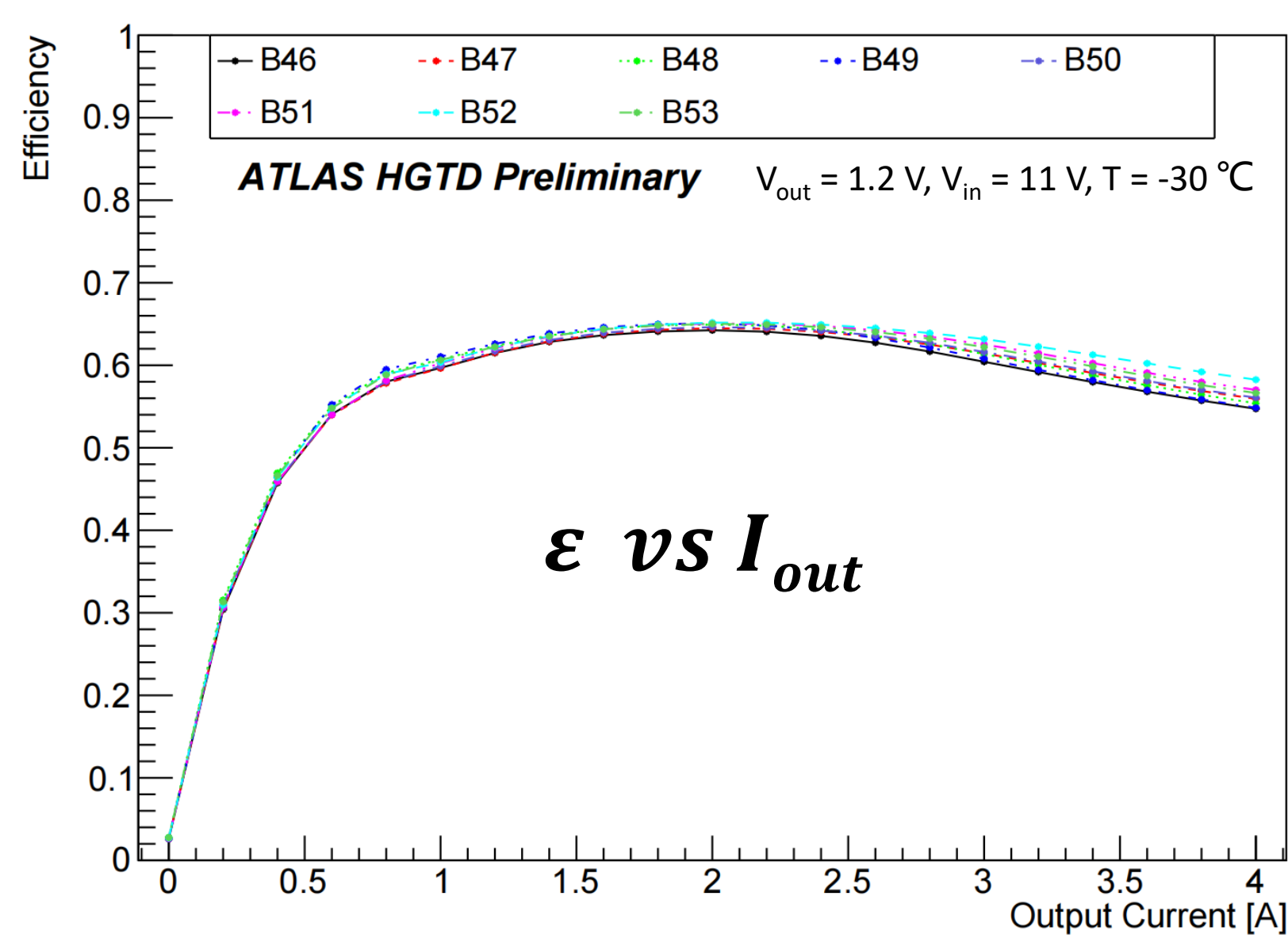
Test in temperature cycle



HGTD Operation temperature: -30 °C



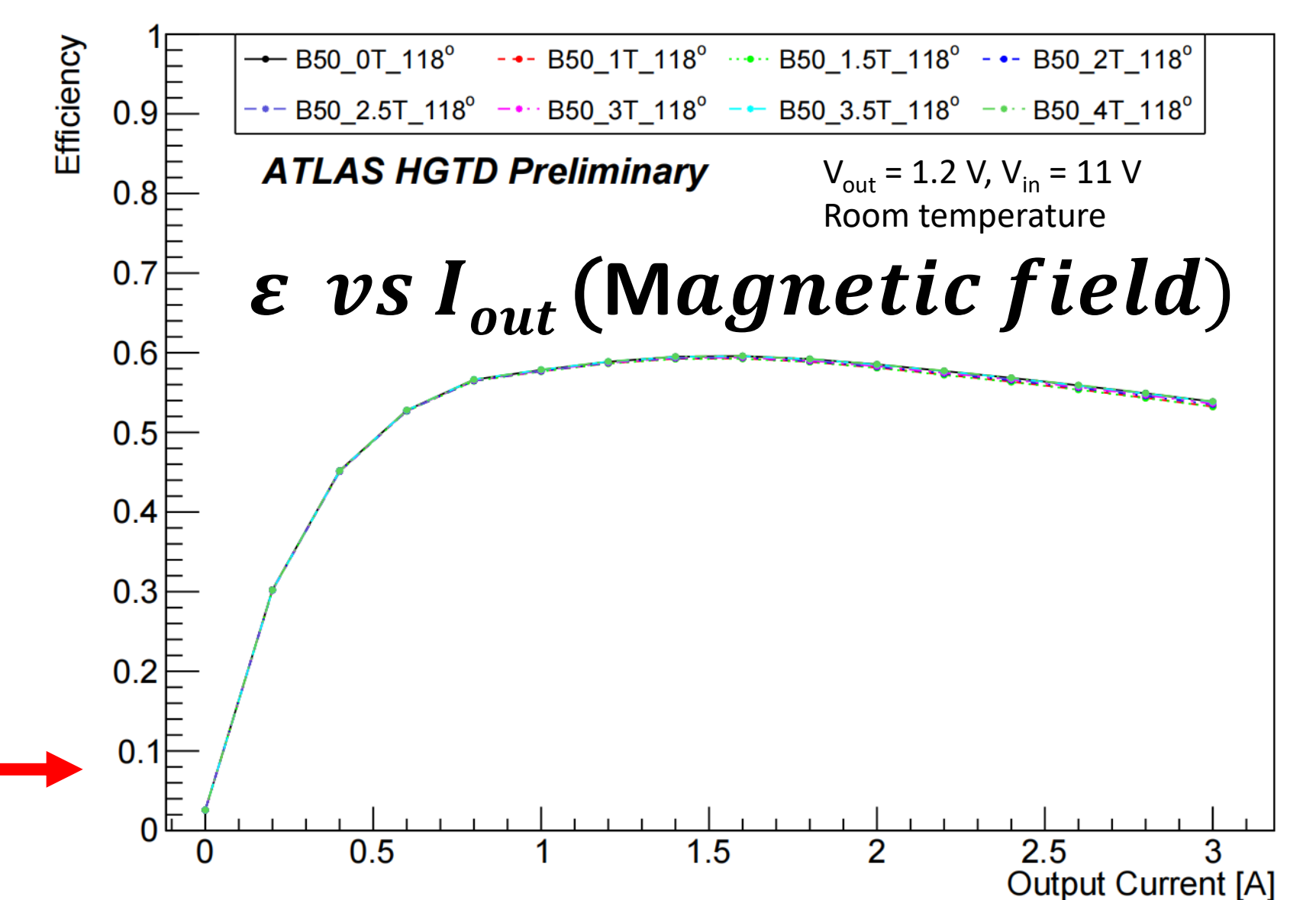
Efficiency



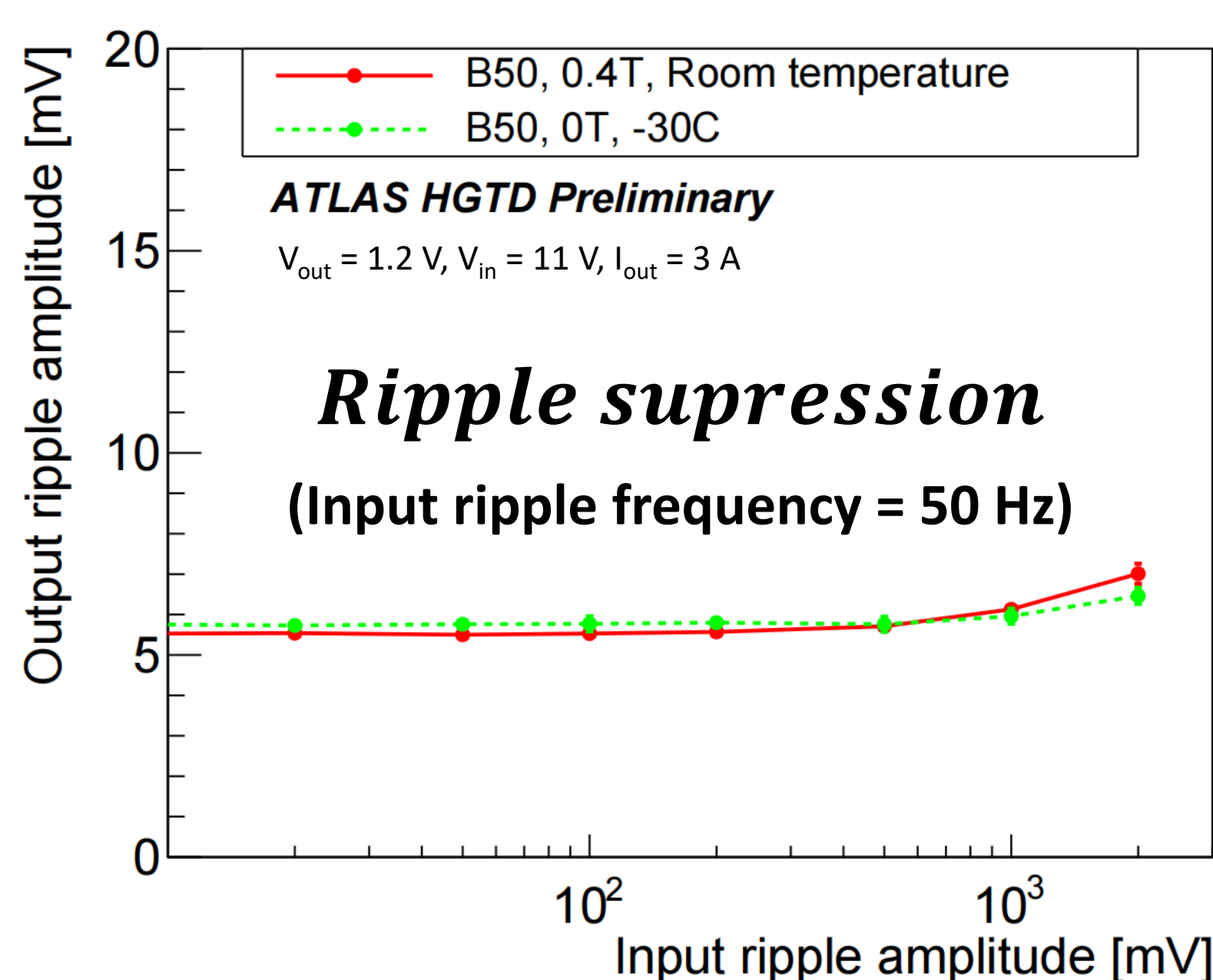
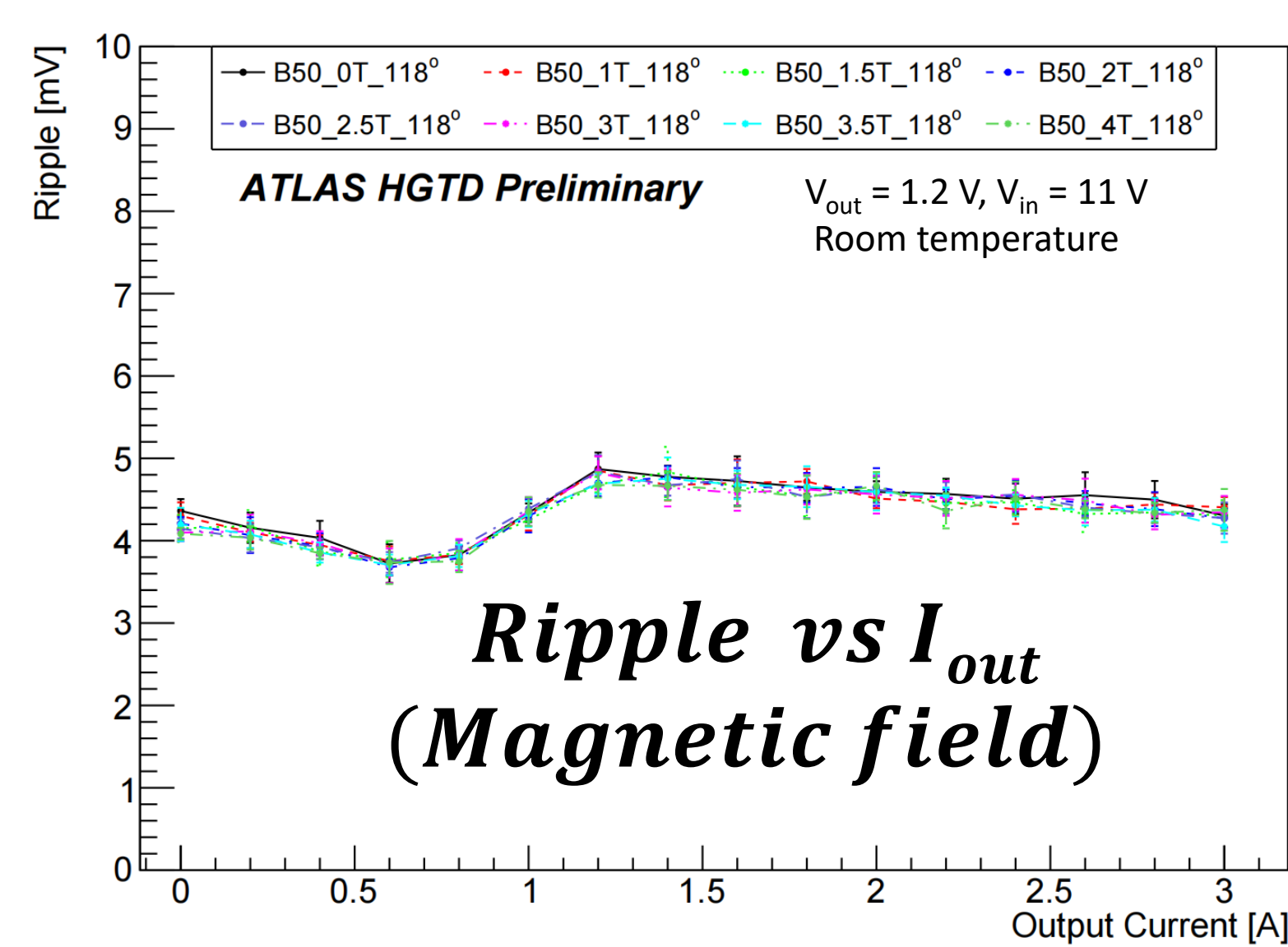
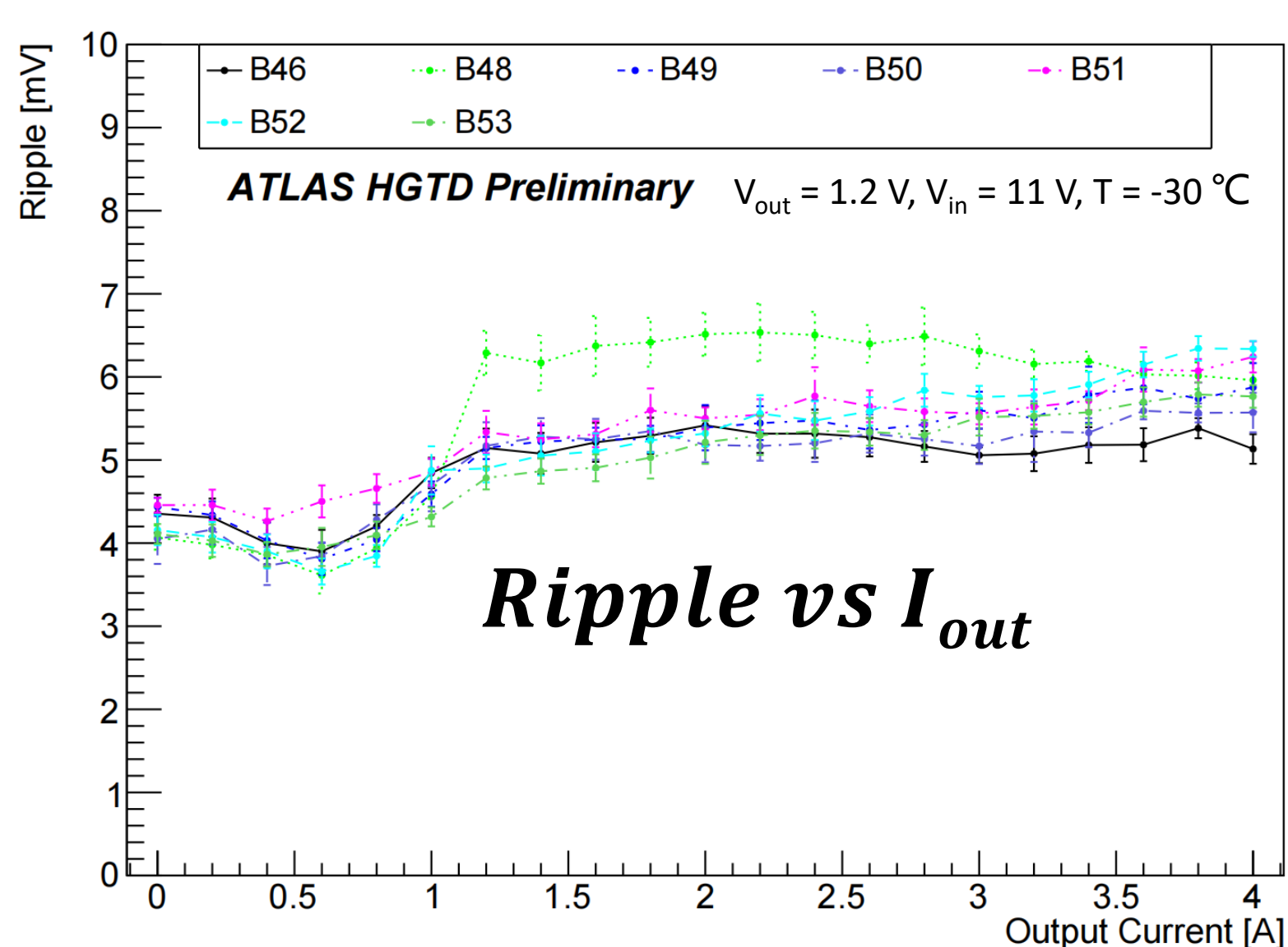
- Efficiencies are tested for different cases of output current (I_{out}), input voltage (V_{in}) and temperature (T).

- Based on the tested data, the fitted efficiency function has been derived.

- Similar tests are performed with magnetic field in room temperature. -> Negligible impact from magnetic field up to 4 T.

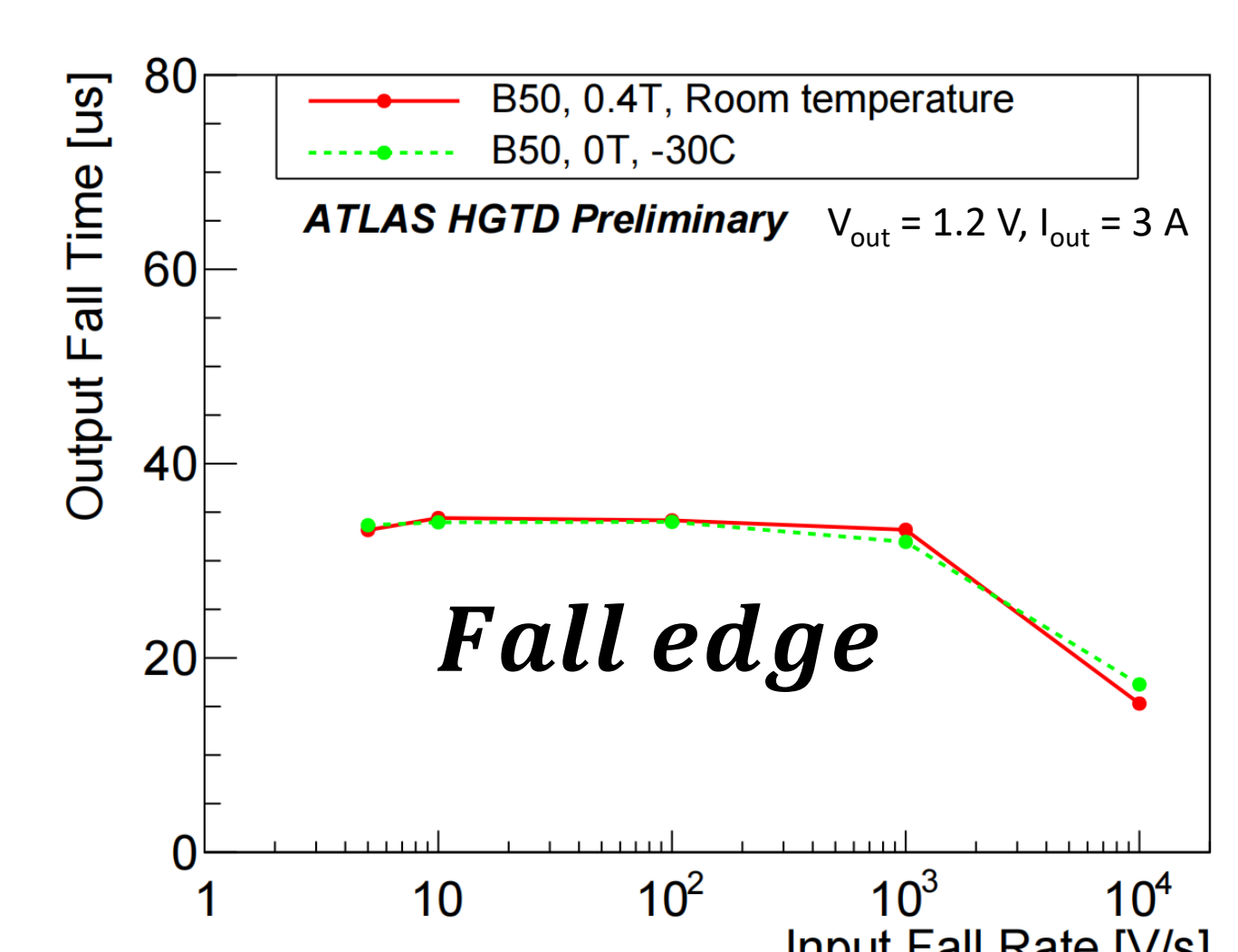
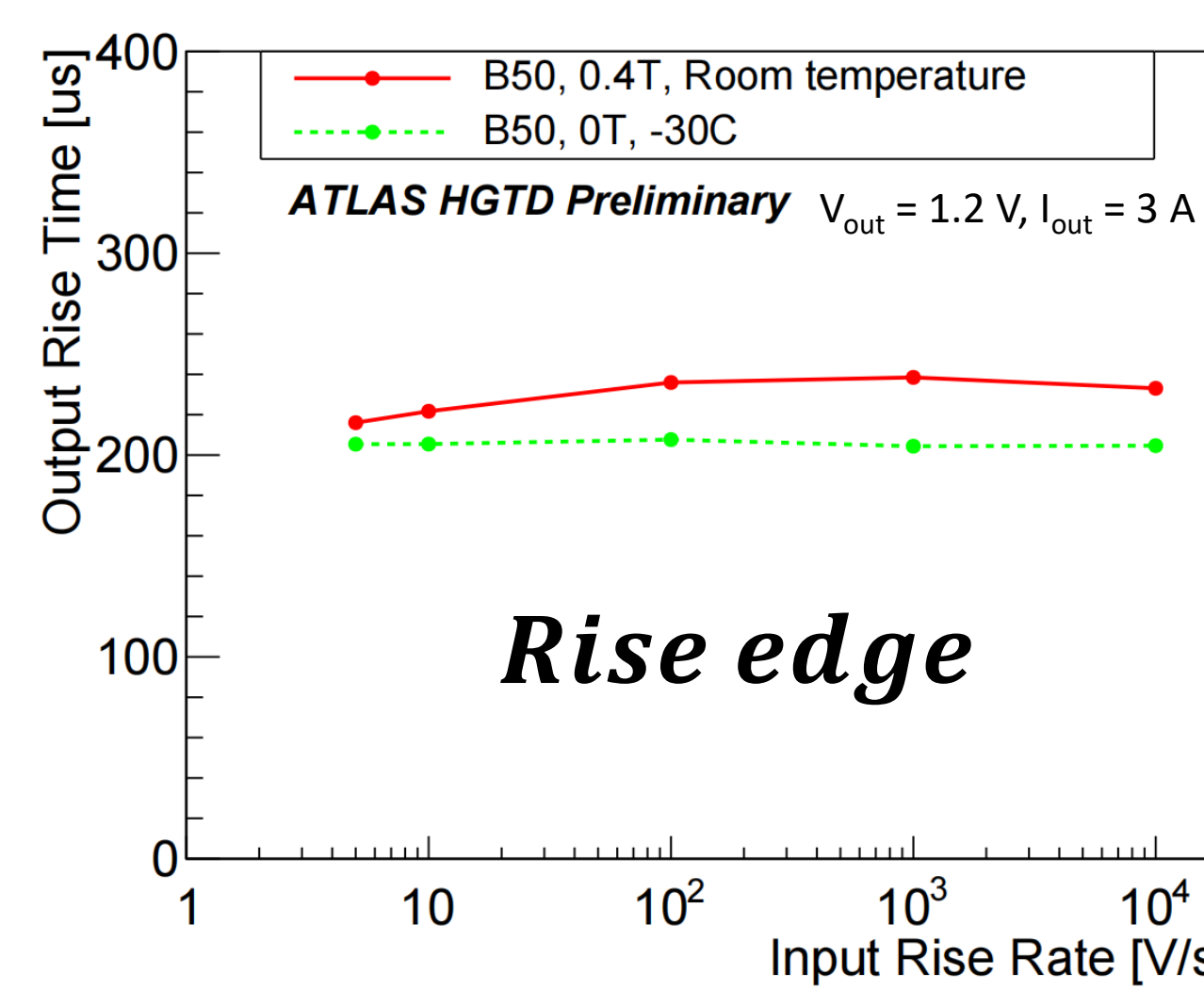


Ripple



- Without input ripple:
 - Output ripples are around 4~6 mV.
 - Negligible impact from magnetic field.
- With input ripple:
 - Negligible impact on output ripple if input ripple amplitude < 1000 mV (frequency = 50 Hz).
 - Observed in both temperature tests at -30 °C magnetic field tests at 0.4 T.

Rise/Fall edge



- The rise time is smaller than 300 μ s, and the fall time is smaller than 50 μ s.
- Independent of rising/falling rate of input voltage.
- Observed in both temperature tests at -30 °C magnetic field tests at 0.4 T.

Conclusion

The DC/DC BPOL12V power converter block satisfies the HGTD Peripheral Electronics requirements, both in low temperature down to -30 °C and under a magnetic field of ~0.4 T.