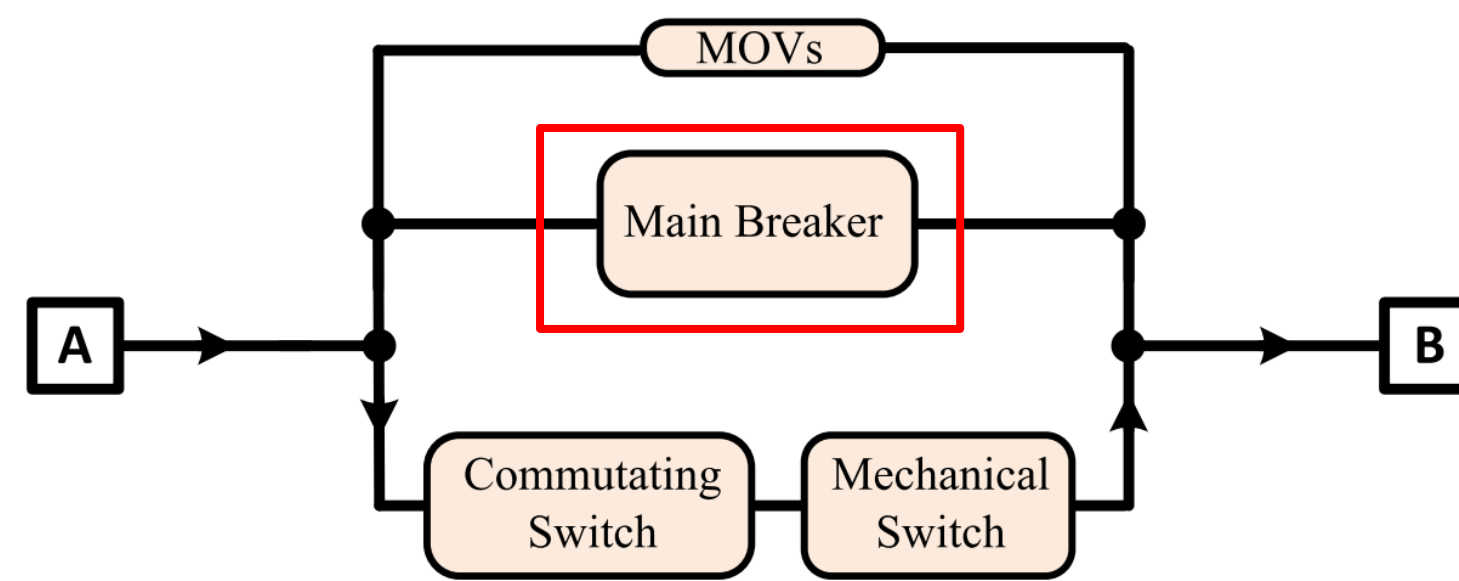


Overview

1. Background

- ❑ Develop a high current Solid State Circuit Breaker (Main Breaker in FID) to protect a 7.2 kV/200 A single phase lateral line in 12 kV distribution system;
- ❑ Perform the function of interrupting the large fault current, e.g., 200A, during short circuit or overload and reclosing the hybrid dc circuit breaker during normal conditions.



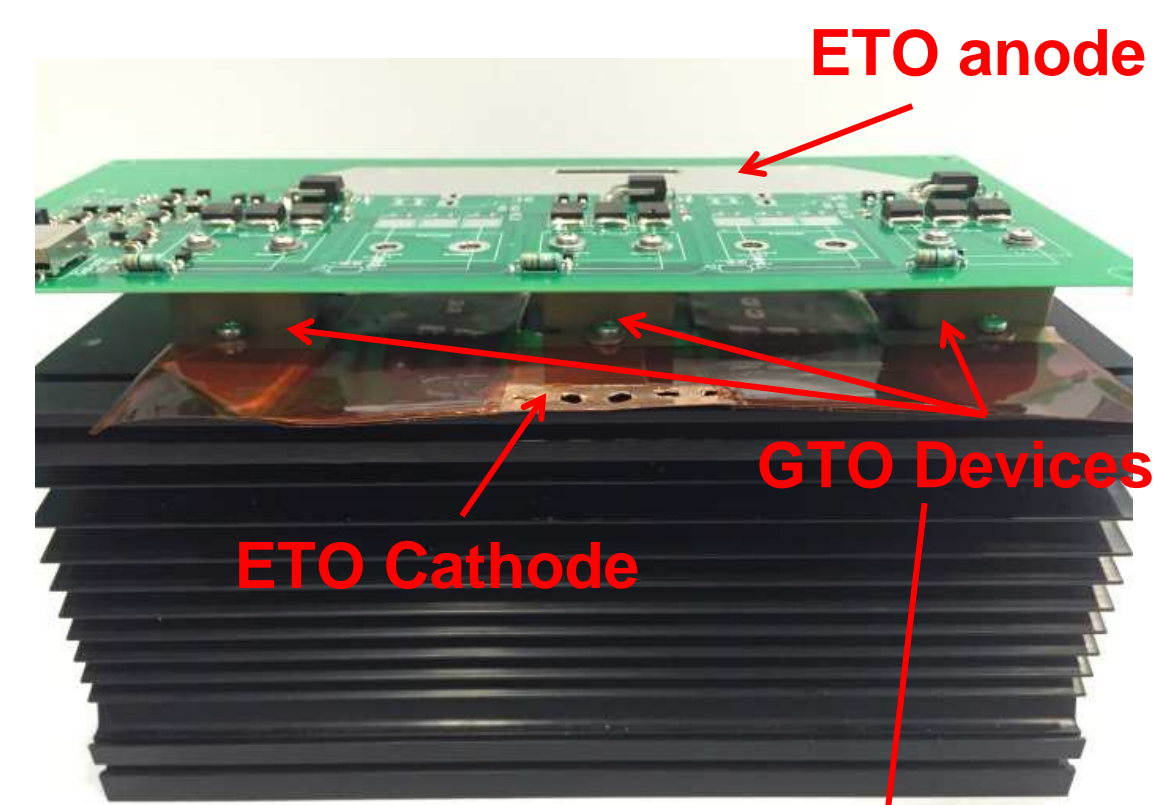
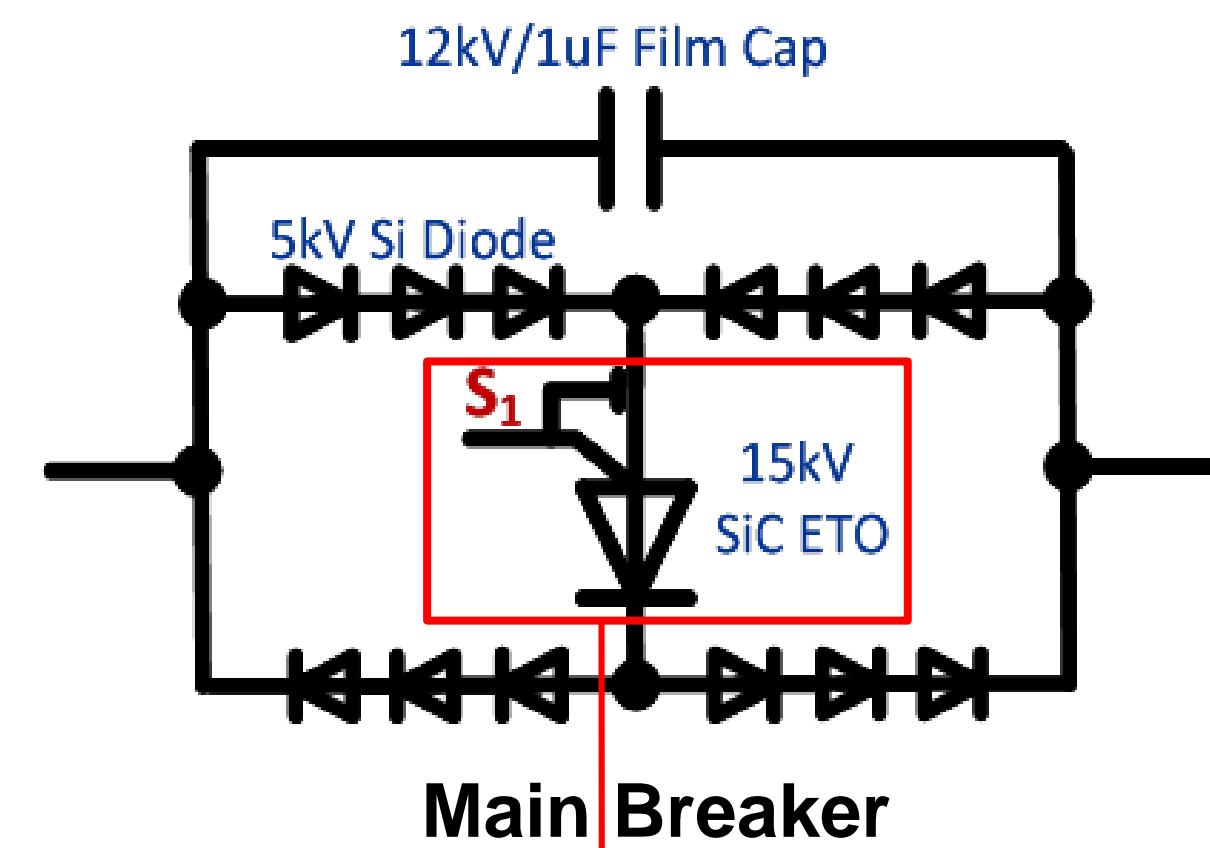
Hybrid dc circuit breaker diagram

2. Problem statement

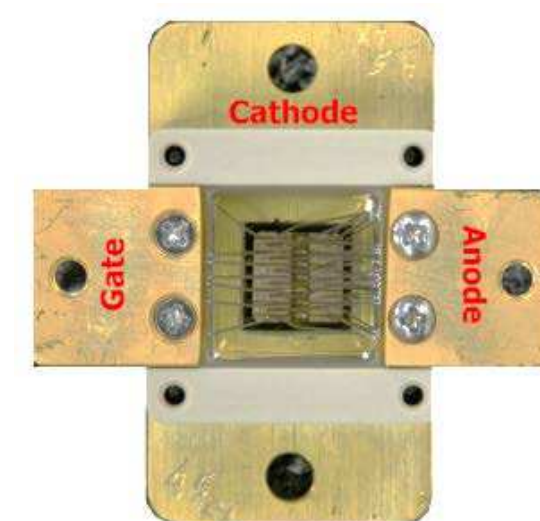
- ❑ In order to have ultrafast protection of electric power system and capability to avoid arcing and to speed up the interruption process, solid state circuit breaker such as 15kV SiC ETO is used.
- ❑ Current available 15kV SiC ETO cannot provide large fault current (200A) interruption, thus parallel operation is needed. But there might be issues with parallel operation of several devices.

Method

1. Experiment Design



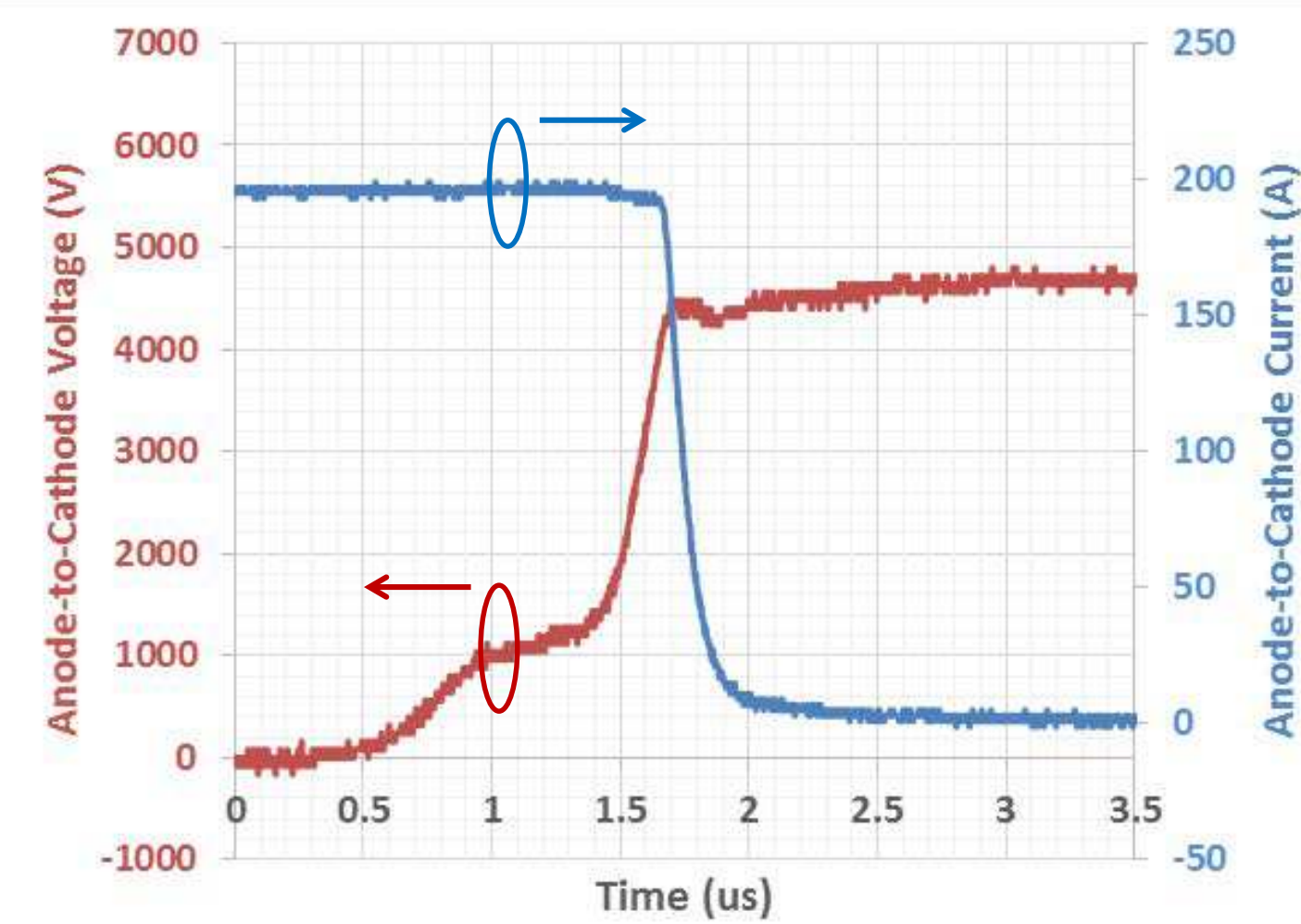
Paralleled SiC ETO



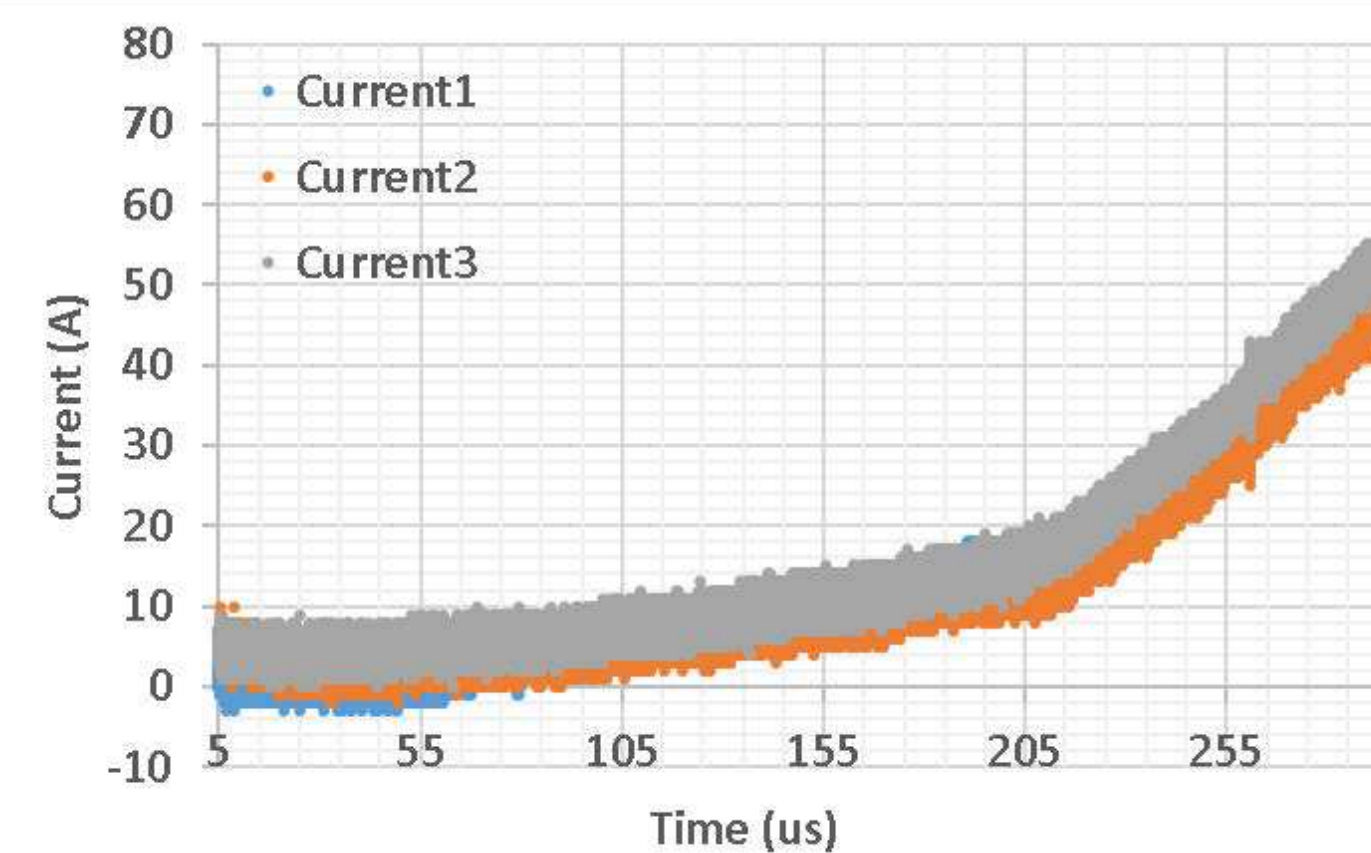
Packaged for HV testing
15kV SiC GTO

Results

1. Conclusions



3-Parallel ETO Turn-off @ 4.5kV/200A



3-Parallel ETO DC Current Sharing
(120kHz current sensor output)

2. Impacts

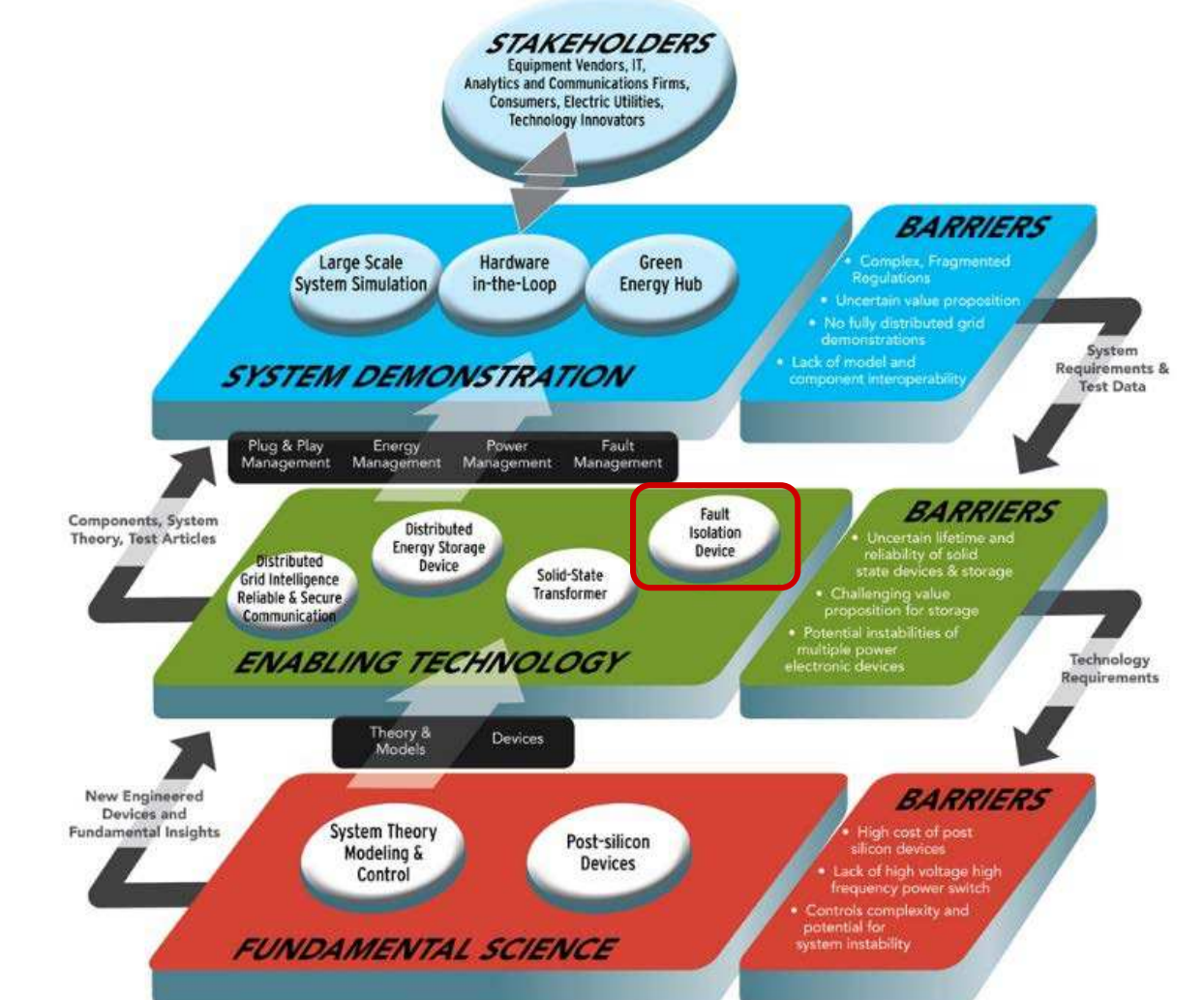
- ❑ Successful testing up to 4.5kV/200A turn-off within 3us.
- ❑ Successful current sharing among three paralleled ETO devices.

3. Future Work

- ❑ Higher current turn-off.

References

1. X. Song, C. Peng and A. Q. Huang, "A Medium-Voltage Hybrid DC Circuit Breaker, Part I: Solid-State Main Breaker Based on 15 kV SiC Emitter Turn-OFF Thyristor," in IEEE Journal of Emerging and Selected Topics in Power Electronics, vol. 5, no. 1, pp. 278-288, March 2017.



Partners

