

# Evaluation of Full Vehicle Thermal Propagation Test Methods

Submission to IWG for GTR 20

October 2021 –IWG #22

# Scope

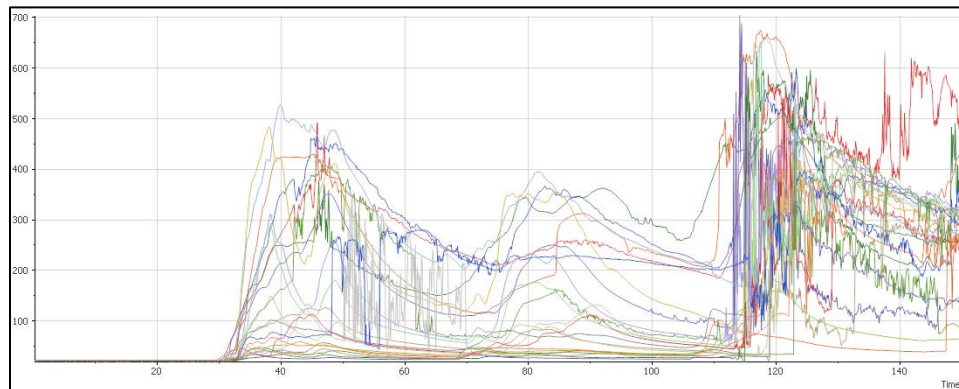
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- Develop test procedure for full vehicle thermal propagation using rapid heater and nail penetration methodologies.
  - NRC TRIM rapid heater
  - ISO 6469-1 nail penetration
- Evaluate test methods on various battery pack technologies.
  - Chevrolet Bolt, Nissan Leaf, Tesla Model 3

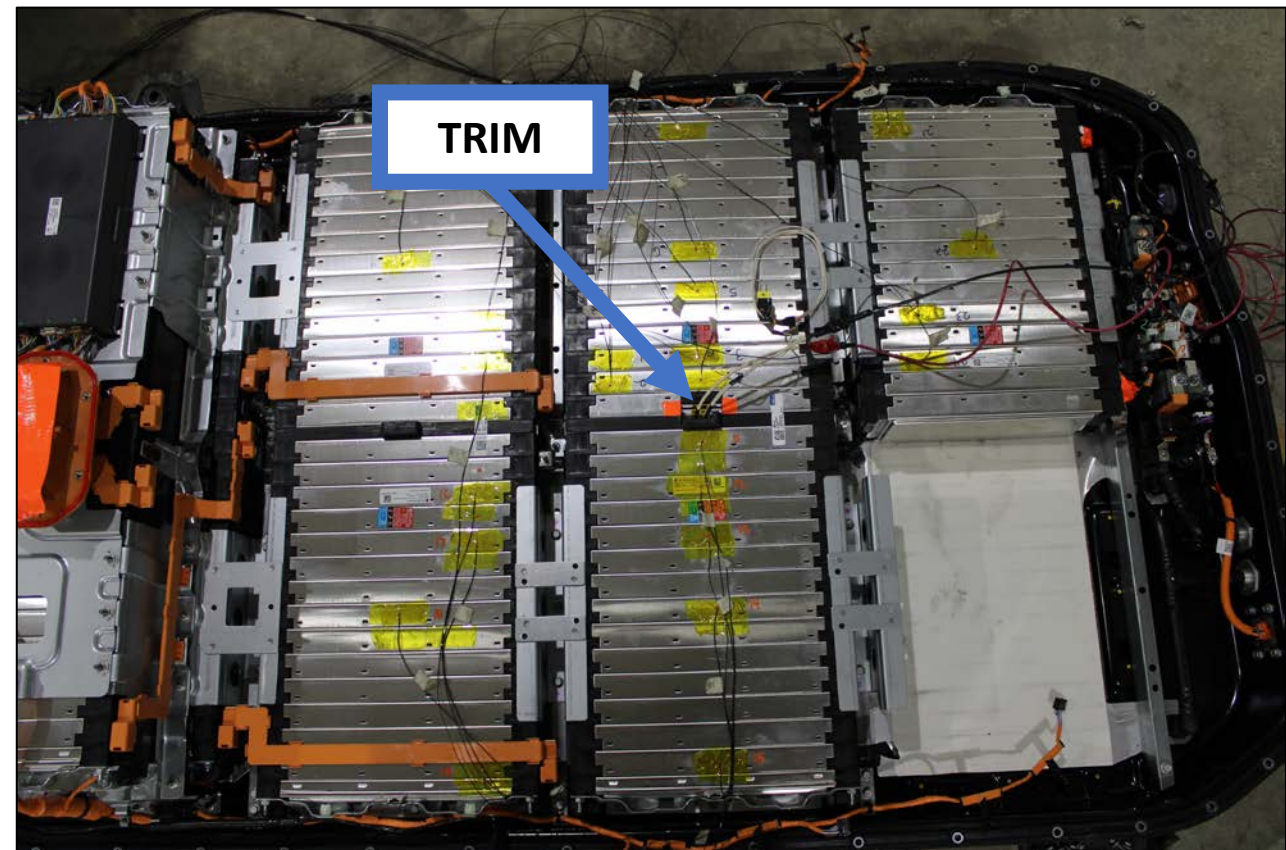


# Chevrolet Bolt Pack Thermal Propagation

- Experimental test to confirm lab operation of TRIM system
- Candidate cell criteria:
  - Accessibility
  - Ability to replicate with nail pen

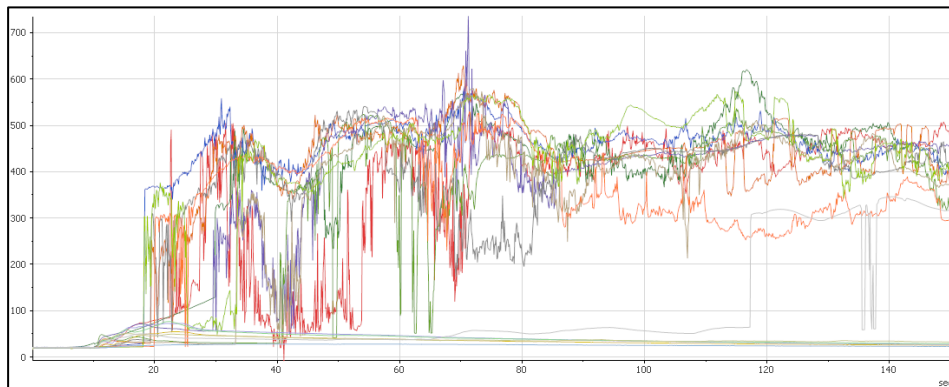


Note: DUT test condition not indicative of full vehicle configuration



# Nissan Leaf Pack Thermal Propagation

- Experimental test to confirm lab operation of TRIM system
- Candidate cell criteria:
  - Accessibility
  - Ability to replicate with nail pen



Note: DUT test condition not indicative of full vehicle configuration



## Next Steps

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- Confirmed operation of TRIM system
- Initial tests planned for late Fall 2021
  - Rapid heater method to be conducted first, with nail penetration to follow.



Open Roof Test Facility – 21m x 18m

## Preliminary Data From Initial Test (1 of 3)

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- MY 2019 Chevrolet Bolt
- Vehicle OFF during test
- Wheels and tires removed for test
- Heater ramp to 700°C over 10 seconds
  - Heater powered off 12 seconds after time zero
- Outdoor Ambient Conditions
  - Temperature: 16°C
  - Wind: 4.5 m/s from the SW

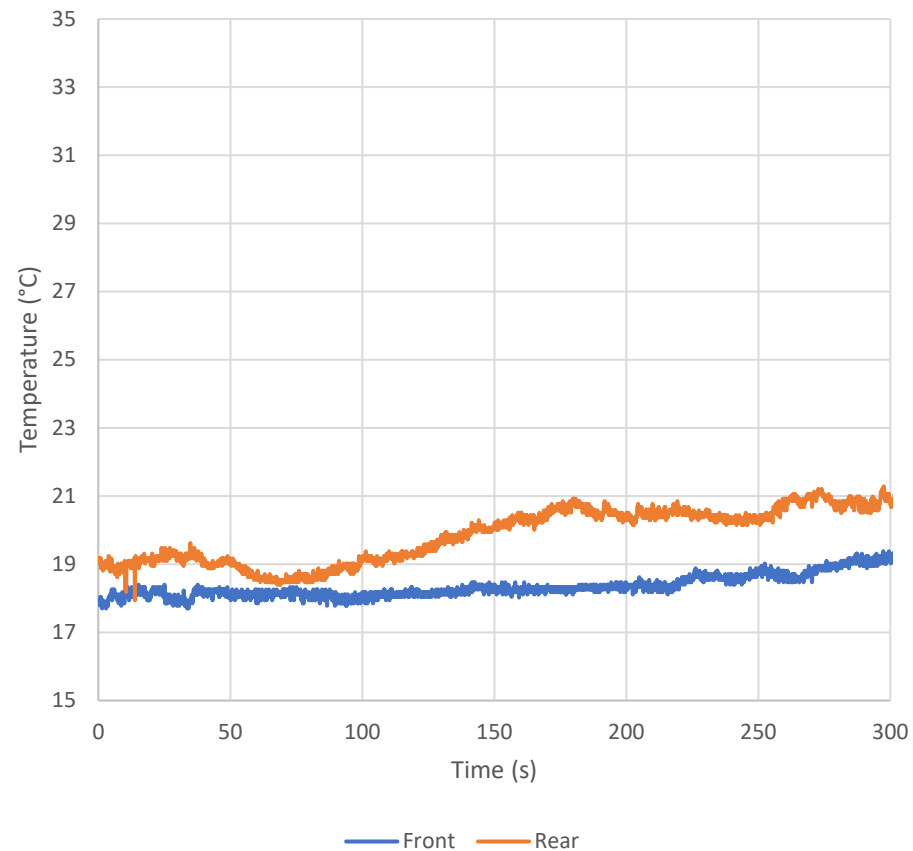


# Preliminary Data From Initial Test (2 of 3)



# Preliminary Data From Initial Test (3 of 3)

Occupant Compartment Temperature



Battery Thermocouples

