

Intelligent Universal Transformer Design and Applications

Session 1

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What is the IUTTM?





IUTApplications





IUT Functions in the Smart Grid

- Voltage control (enable implementation of conservation voltage control with complete controllability at the local level)
 - Significant energy savings potential
 - Demand management
- Integration of storage and renewables with the IUT
 - Significant advantages for storage at IUT (multiple customers combined) compared to storage at individual customers
 - Facilitates integration of intermittent renewables (PV smart inverter)
 - Microgrid applications (reliability improvement)
- Bus and monitoring for PHEV charging
- Improved efficiency at light loads ideal for applications that involve storage and renewable generation applications



Applications of IUT in a Smart Grid Infrastructure





Functional Block Diagram





Loss Considerations

- Conventional transformers have losses that are significant even at light load
 - Core losses dominate a light load
 - Winding losses dominate at heavy loads
- IUT will have higher losses at peak load (e.g. 5%) but can have significantly lower losses at light load.
- This is particularly important for applications involving storage and DG where the transformer load is often very low.



Development Plans

Field Prototype Field Prototype Field Prototype Anticipated Effort Development **Development** Development (2008 - 2009)(2010)(2011)**100KVA 15KV Class IUT POLE MOUNT IUT PAD Mount** Design **Build Unit Field Trials** Thermal Analysis **Finalize Product Specs Finalize Design Build & Test** Finalize Commercialization Plan Power Stack 25KVA Unit Assembly Factory Lab Test 100KVA 15KV Class Test IUT PADMOUNT Lab Test **Power Stack Assembly Thermal Analysis Build & Test** Performance 100KVA Unit Initial Design and Analysis Lab Test Verification **Factory Test Finalize Product Specs Factory Test Field Trials Detailed Padmount Design and Analysis** 2011 2009 2010



Questions?

