

# Minutes, PSMA Magnetics Committee

August 17, 2015

Most of the teleconference meeting was devoted to planning the Industry Session for APEC2016 in Long Beach, CA.

The topics were discussed and potential speakers were identified for a number of them. The names of candidate speakers are not included in the minutes because some have not been contacted. Ray Ridley has committed to present the opening discussion.

We cannot make any official announcements or extend official invitations until we are notified of the acceptance of the proposal, though, in practice, no PSMA proposal has ever been rejected. Also, until formal notification, we will not know the specific time nor how many time slots we have. It very likely will be six or seven.

Attached is a draft of the proposal. The deadline for submittal is September 7, 2015, though we plan to submit it sooner. Please look it over and make suggestions, particularly if you see any errors.

Steve Carlsen  
Ed Herbert  
Co-Chairmen  
PSMA Magnetics Committee

# Proposal for an Industry Session for APEC2016

PSMA Magnetism Committee,  
August 20, 2015

The PSMA Magnetism Committee is proposing an Industry Session for APEC2016. The subject will be “**High Frequency Magnetism**”.

Hypothetically, a small to medium sized power converter manufacturer with limited resources is facing the problem of making their products much smaller, by converting to a higher frequency to shrink the magnetism and capacitors. What issues do they need to confront, and what problems do they need to solve?

## **High Frequency Magnetism: Black Magic, Art or Science?**

Improved materials and analytical tools are removing the mystery from magnetic design.

### **1. High Frequency Magnetism Overview. Where we are, and where we need to go**

Ray Ridley,

### **2. Magnetic Material, ,**

What materials to use and how to select them

### **3. Core loss analysis**

Steinmetz-like equations

SPICE

Finite element analysis

Fringing losses in gapped cores

Use electrical units

Emphasize data on components, not material

### **4. Winding losses**

Skin effect, penetration depth

Proximity effects

Litz wire, and printed equivalents

### **5. Stray Impedance, Capacitive and Inductive**

Stray capacitance becomes critical for higher voltages at high frequency.

Inter-winding and stray capacitance to heat sinks

Charge time for MOSFET parasitic capacitance

Stray and leakage inductances become important for higher currents at high frequency, particularly for low voltage applications

### **6. Thermal**

It's challenging enough to shrink magnetism without increasing the losses. Even if losses are kept the same, the power density increases dramatically.

### **7. Shrinking magnetism**

Formulae for shrinking magnetic components while keeping losses the same or lower.

Respectfully submitted, by

Steve Carlsen

Ed Herbert

Co-Chairmen

PSMA Magnetism Committee