New TDK high frequency Mn-Zn FER materials

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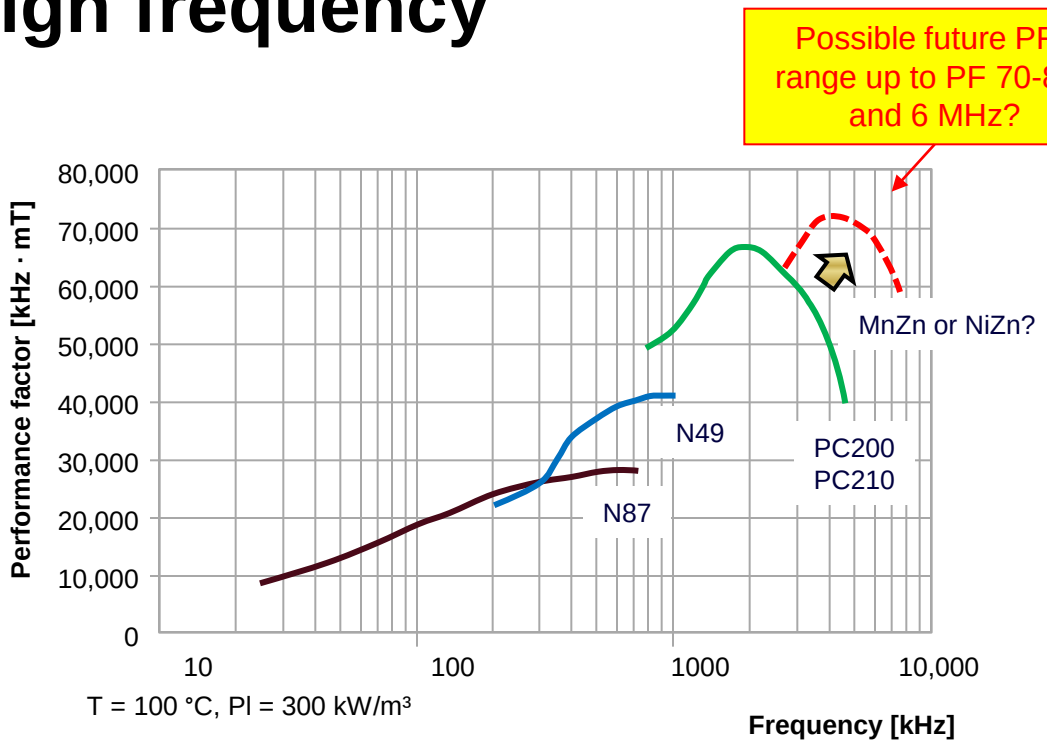
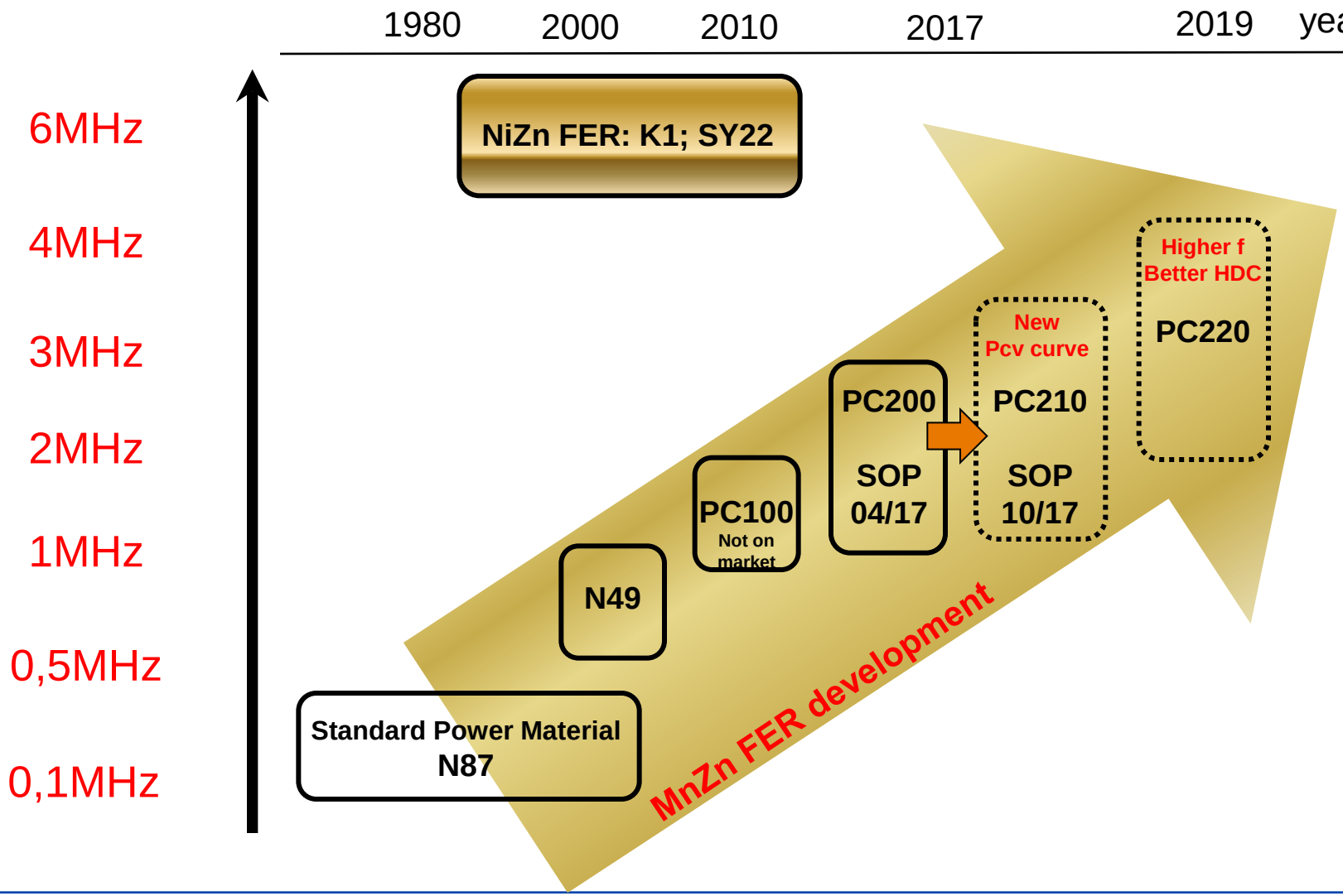
New materials – High frequency



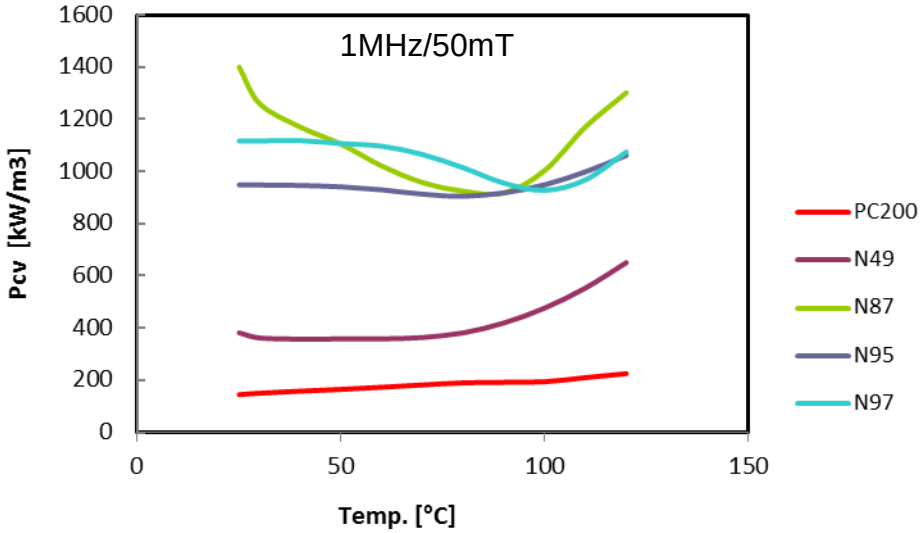
- Higher switching f => compact core shape
- Lower Pl at high f => higher efficiency, lower heat rise

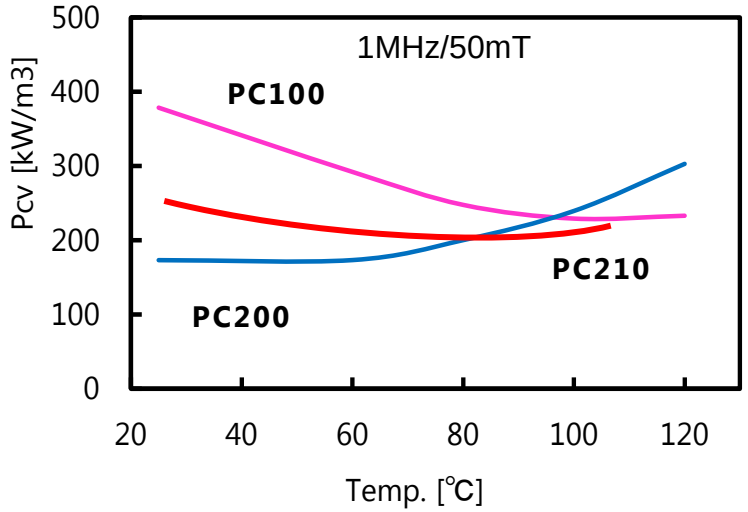
Target: Increase power density by using higher switching frequencies.

High frequency material road map



Power loss vs temperature curves at 1MHz





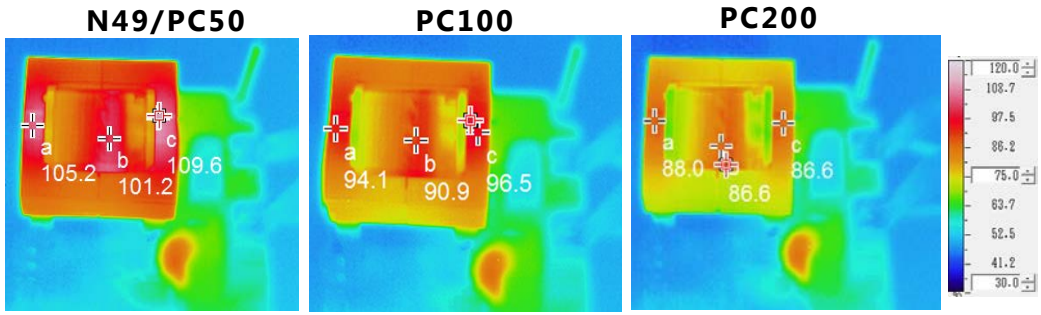
- PC200 has lowest Pcv from 1MHz
- flat characterictics of Pcv vs temperature.
- PC200 has min of Pcv at room temperature -> low stability at high temperature

PC100 and PC200 will be unified as PC210.

Evaluation results of PC200

Core Shape
EER42
Po=700W

Fsw≒1MHz
Vin=380V
Po=700W (Vo=260V)
ΔB=79.6mT(Cal.)



Efficiency: 96.4%
Temperature: 109.6℃

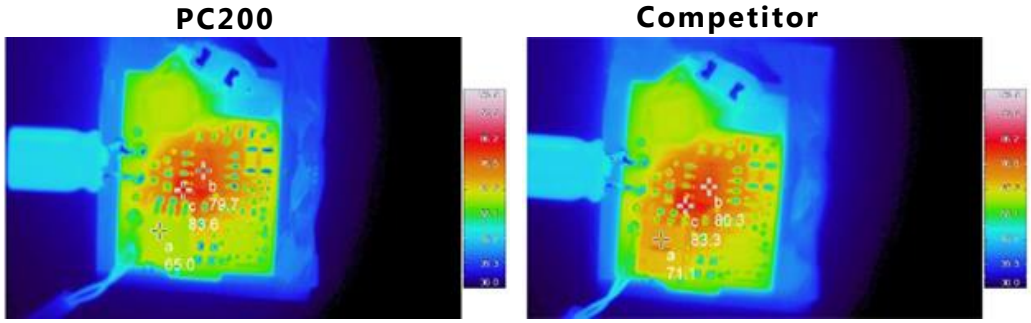
Efficiency: 96.5%
Temperature: 96.5℃

Efficiency: 96.5%
Temperature: 86.6℃

Efficiency is same but surf. temperature is different

Core Shape
EP6
Po=6W

Fsw=700kHz
Vin=100V
Po=5.77W(Vo=36.4V)
ΔB=150mT(Cal.)

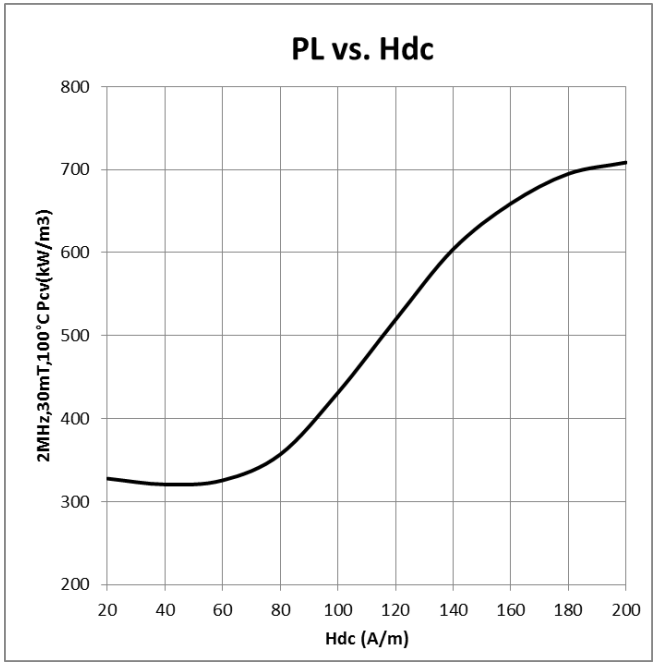


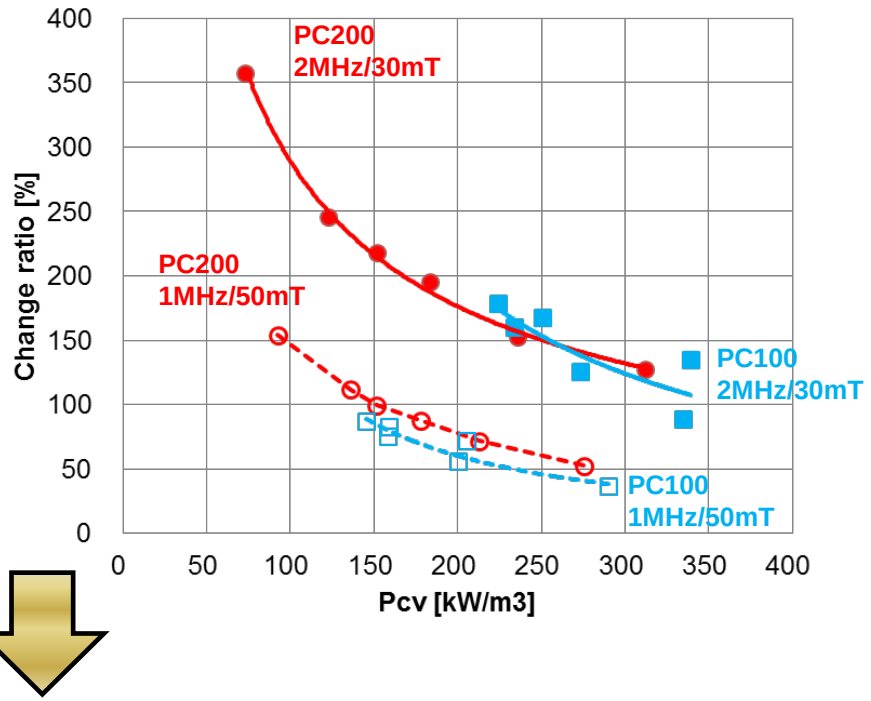
Efficiency: 82.9%
Temperature: 65.0℃

Efficiency: 82.8%
Temperature: 71.1℃

Degradation of power loss under magnetic field

- Under influence of DC magnetic field the power loss increase.
- Heat treatment or demagnetization returns power loss to original state
- The degradation of the power loss **depends on absolute value of Pcv**





Development of PC220 to reduce the Pcv degradation


TDK