New TDK high frequency Mn-Zn FER materials
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

- **NiZn FER: K1; SY22**
- **N87**
- **N49**
- **Standard Power Material**
- **PC200 SOP 04/17**
- **PC210 SOP 10/17**
- **PC220**
- **Higher f Better HDC**

Frequency ranges:
- 6MHz
- 4MHz
- 3MHz
- 2MHz
- 1MHz
- 0.5MHz
- 0.1MHz

Years:
- 1980
- 2000
- 2010
- 2017
- 2019

Legend:
- Not on market
- New Pcv curve
- MnZn FER development

Attracting Tomorrow
Power loss vs temperature curves at 1MHz

- PC200 has lowest Pcv from 1MHz
- Flat characteristics 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.)

Core Shape
EP6
Po = 6W

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

Efficiency is same but surf. temperature is different
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.