

FERROXCUBE - your global partner

Australia: Contact Ferroxcube Taiwan
Tel: +886 2 86650099, Fax: +886 2 86650145

Austria: Contact Ferroxcube Germany
Tel: +49 (040) 527 28 305, Fax: +49 (040) 527 28 306

Benelux: Ferroxcube Netherlands, EINDHOVEN
Tel: +31 (0)40 27 24 216, Fax: +31 (0)40 27 24 411

Canada: Contact Ferroxcube USA
Tel: +1 915 599 2513/2328, Fax: +1 915 599 2555

China: Ferroxcube Hong Kong, SHANGHAI
Tel: +86 21 6380 0607 / 3121, Fax: +86 21 6380 0910

Czech Republic: Contact Ferroxcube Poland
Tel: +48 46 834 00 07, Fax: +48 46 834 00 35

Denmark: Contact Ferroxcube Sweden
Tel: +46 8 580 119 76, Fax: +46 8 580 121 60

Finland: Contact Ferroxcube Sweden
Tel: +46 8 580 119 76, Fax: +46 8 580 121 60

France: Ferroxcube France, NANTERRE
Tel: +33 (01) 5551 8422, Fax: +33 (01) 5551 8423

Germany: Ferroxcube Germany, HAMBURG
Tel: +49 (040) 527 28 302, Fax: +49 (040) 527 28 306

Greece: Contact Ferroxcube Italy
Tel: +39 02 241131 1, Fax: +39 02 241131 11

Hungary: Contact Ferroxcube Poland
Tel: +48 46 834 00 07, Fax: +48 46 834 00 35

Hong Kong: Ferroxcube Hong Kong, HONG KONG
Tel: +852 2319 2740, Fax: +852 2319 2757

Indonesia: Contact Ferroxcube Singapore
Tel: +65 6244 7815, Fax: +65 6449 0446

Ireland: Contact Ferroxcube UK
Tel: +44 1306 646200, Fax: +44 1306 646222

Israel: Arrow\Rapac Ltd., PETACH TIKVA
Tel: +972 3 9203480, Fax: +972 3 9203443

Italy: Ferroxcube Italy, SESTO S. GIOVANNI (MI)
Tel: +39 02 241131 1, Fax: +39 02 241131 11

Malaysia: Contact Ferroxcube Singapore
Tel: +65 6244 7815, Fax: +65 6449 0446

Mexico: Contact Ferroxcube USA
Tel: +1 915 599 2513/2328, Fax: +1 915 599 2555

New Zealand: Contact Ferroxcube Taiwan
Tel: +886 2 86650099, Fax: +886 2 86650145

Norway: Contact Ferroxcube Sweden
Tel: +46 8 580 119 76, Fax: +46 8 580 121 60

Philippines: Contact Ferroxcube Singapore
Tel: +65 6244 7815, Fax: +65 6449 0446

Poland: Ferroxcube Polska, SKIERNIEWICE
Tel: +48 46 834 00 07, Fax: +48 46 834 00 35

Portugal: Contact Hispano Ferritas, Spain
Tel: +34 (93) 317 2518, Fax: +34 (93) 302 3387

Singapore: Ferroxcube Singapore, SINGAPORE
Tel: +65 6244 7815, Fax: +65 6449 0446

Slovak Republic: Contact Ferroxcube Poland
Tel: +48 46 834 00 07, Fax: +48 46 834 00 35

Spain: Hispano Ferritas, BARCELONA
Tel: +34 (93) 317 2518, Fax: +34 (93) 302 3387

Sweden: Ferroxcube Sweden, JÄRFÄLLA
Tel: +46 8 580 119 76, Fax: +46 8 580 121 60

Switzerland: Contact Ferroxcube Germany
Tel: +49 (040) 527 28 305, Fax: +49 (040) 527 28 306

Taiwan: Ferroxcube Taiwan, TAIPEI
Tel: +886 2 86650099, Fax: +886 2 86650145

Turkey: Contact Ferroxcube Italy
Tel: +39 02 241131 1, Fax: +39 02 241131 11

United Kingdom: Ferroxcube UK, DORKING
Tel: +44 1306 646200, Fax: +44 1306 646222

United States: Ferroxcube USA, EL PASO (TX)
Tel: +1 915 599 2513/2328, Fax: +1 915 599 2555

For all other countries apply to closest regional sales office:

■ HAMBURG, Germany
Tel: +49 (040) 527 28 302, Fax: +49 (040) 527 28 306
e-mail: sales europe@ferroxcube.com

■ EL PASO (TX), USA
Tel: +1 915 599 2513/2328, Fax: +1 915 599 2555
e-mail: sales usa@ferroxcube.com

■ TAIPEI, Taiwan
Tel: +886 2 86650099, Fax: +886 2 86650145
e-mail: sales asia@ferroxcube.com

© Ferroxcube International Holding B.V. 2003

All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner.
The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.
No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Visit our web-site for the latest information on new products, application info as well as updated phone- and fax numbers

Internet: www.ferroxcube.com

Printed in The Netherlands 9398 288 01111 Date of release: January 2003

Power Ferrite Measuring Setup EMMA 2.1



Introduction

Formerly a Philips Components company FERROXCUBE now belongs to Yageo Corporation, one of the world's strongest suppliers of passive components.

As a leading innovator in ferrite-ceramic technology, we build on our Philips magnetic components heritage to offer a broad range of soft ferrite cores. We also offer extensive design-in support including application information and software to help equipment manufacturers optimize their new designs.

Our research and development laboratories located in Eindhoven, The Netherlands, can build on 50 years' experience in ferrite technology. This means we know everything about ferrite cores but also about what's needed to make and test them. The specifications and tolerances required for the industrial equipment are generally very demanding and critical. We bring along with us the experience gained by building our own measuring setups since the early years of the ferrite industry.

We offer a complete power ferrite measuring setup as it is used in all Ferroxcube facilities. This will contribute to a standardization of measurement methods throughout the ferrite industry.

The EMMA 2.1 is a computer controlled test unit fully equipped to characterise all important magnetic properties of soft ferrite cores in a wide temperature range. It is a vital tool in research and development as well as for sample testing in production.



The following magnetic properties of power ferrite cores can be measured with the "Standard Application Package":

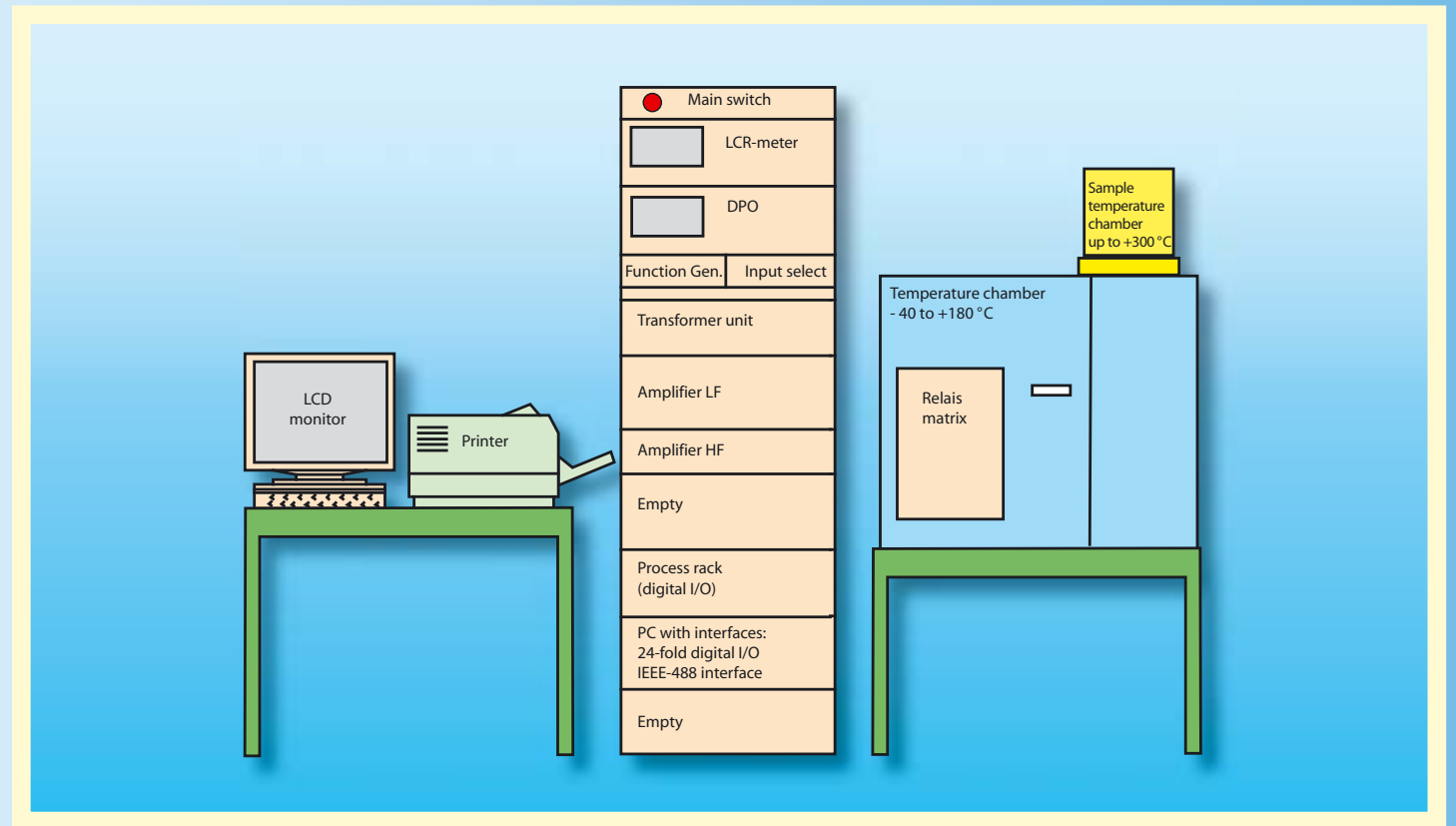
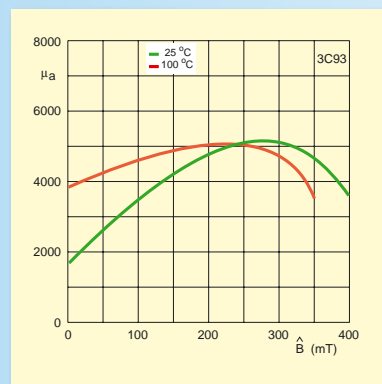
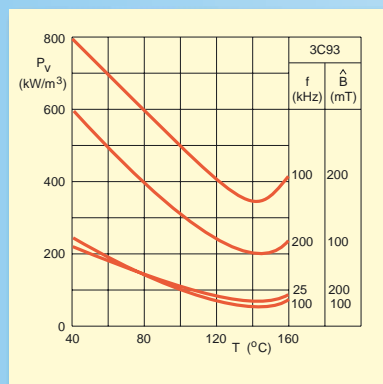
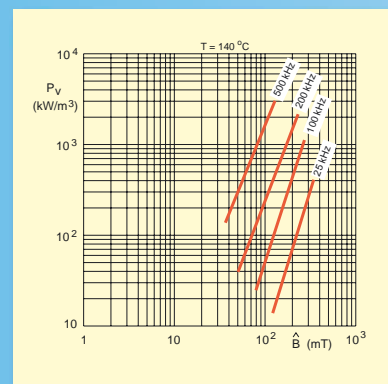
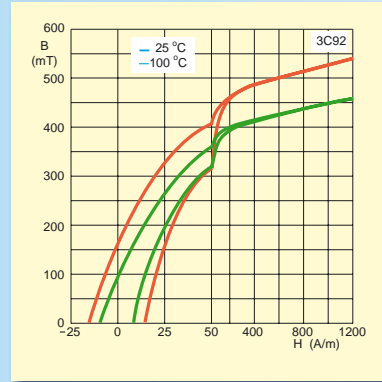
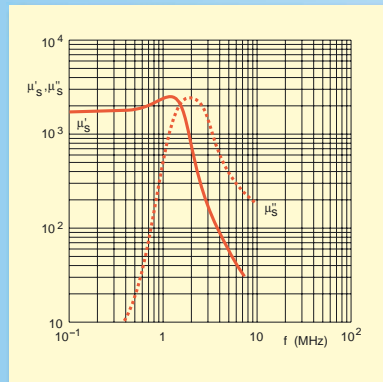
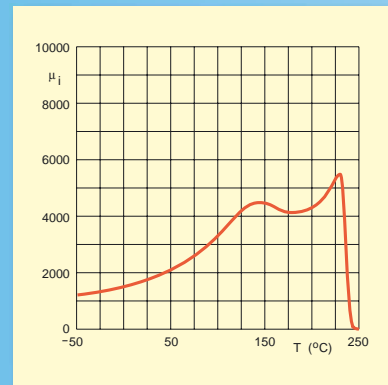
- Power loss density (P_V)
- Peak flux density (B_p)
- Amplitude permeability (μ_a)
- Curve of B-H-loop

To measure power losses the Digitizing Oscilloscope Method is used. Voltage on and current through the DUT are sampled in a few cycles of the BH-loop to avoid self-heating of the ferrite.

With the "Supplement Application Package" the system has the following measuring capabilities:

- Initial permeability (μ_i)
- Temperature factor (α_F)
- Disaccommodation factor (D_F)
- Inductance factor (A_L)
- Temperature curve of permeability
- Loss factor ($\tan\delta/\mu_i$)
- Hysteresis material constant (η_B)
- Resistivity (ρ)
- Curie temperature (T_C)

Contact us to find out more!



Description of setup

The EMMA 2.1 is built in a Rittal cabinet with:

- LCR-meter 0 - 1 MHz
- Function generator 20 kHz - 10 MHz
- Digital Processing Oscilloscope (DPO)
- LF and HF amplifier frequency range: DC - 3 MHz voltage: 0 - 100 V peak current: 6 A peak (depending on load and frequency)
- Temperature chamber with 16-fold 4-pole relay matrix temperature range: -40 to 180 °C.
- Sample temperature chamber temperature range: up to 300 °C
- Industrial PC with I/O boards, modem and LAN.

The system will be delivered with:

- Flat LCD monitor and printer
- Windows 2000 and application software
- Remote diagnostics
- Set of certified test and calibration cores.
- Drawing package and documentation.

Measuring range and accuracy General technical data

Power loss: 10 kHz - 3 MHz
Voltage (B): $\pm 1\%$
Current (H): $\pm 1\%$
Temperature around 100 °C: $\pm 1\%$

The accuracy of the loss measurement depends on the DPO, the inductance value of the DUT and the applied voltage (see graph).

Connected power:

Cabinet:
110/230 V, 50/60 Hz, 1.0 kW

Temperature chamber:
110/230 V, 50/60 Hz, 2.4 kW

Environment temperature:
15 - 25 °C (climate control needed)

