Typical Cores and Shields Geometries

Melexis Current Sensing Applications

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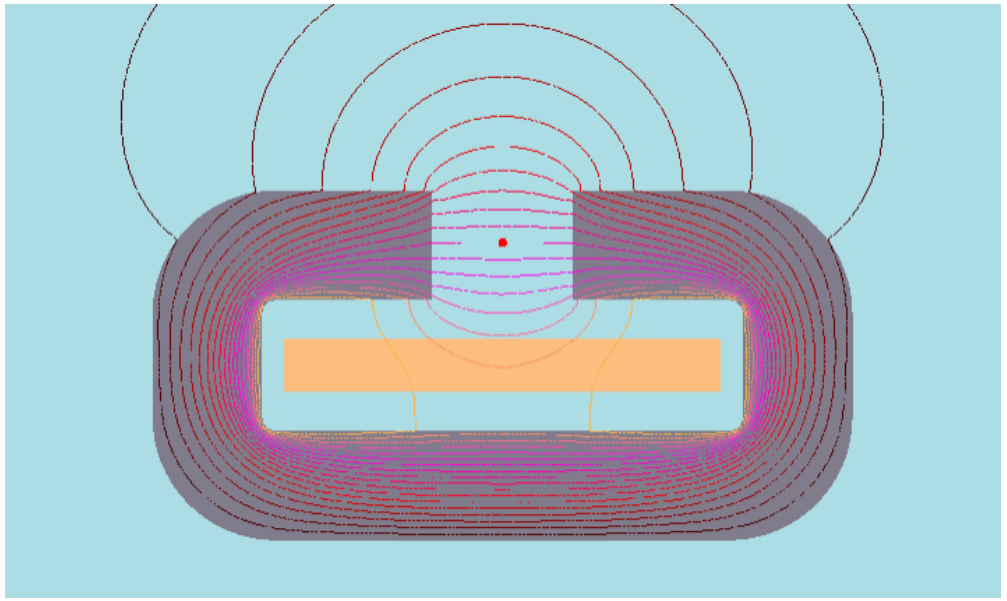
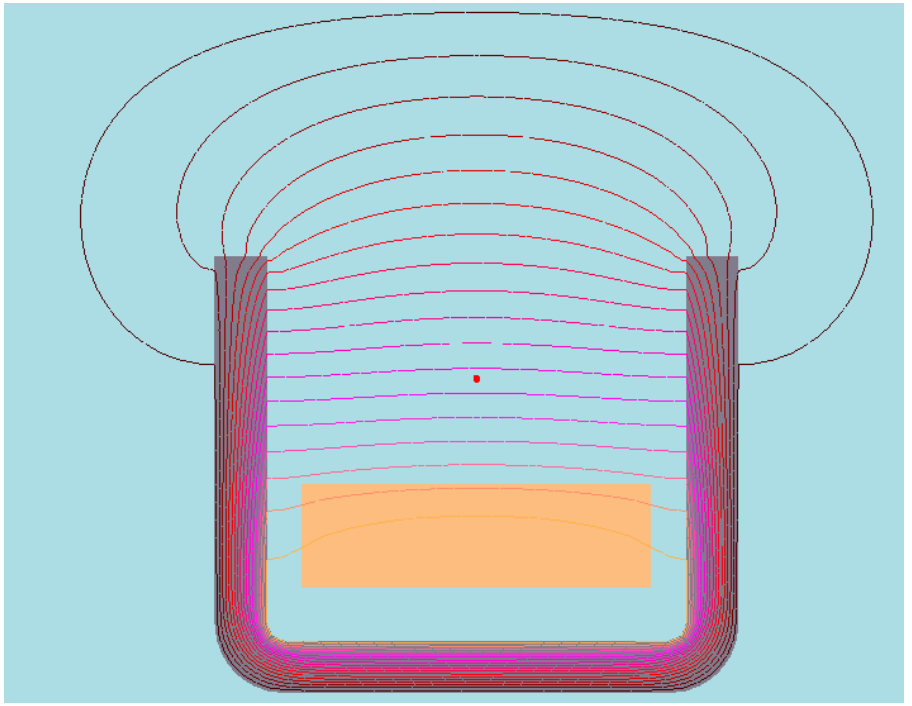
Two Different Solutions

Ferromagnetic Shields and Cores



Ferromagnetic Core + Conventional Current Sensor



Ferromagnetic shield + IMC Current Sensor

All simulated Cores and Shields shown in this presentations are developed in collaboration with our ferromagnetic material supplier, Maglab/PML India. For more details, please access Maglab official website

Typical Shields and Cores Geometries

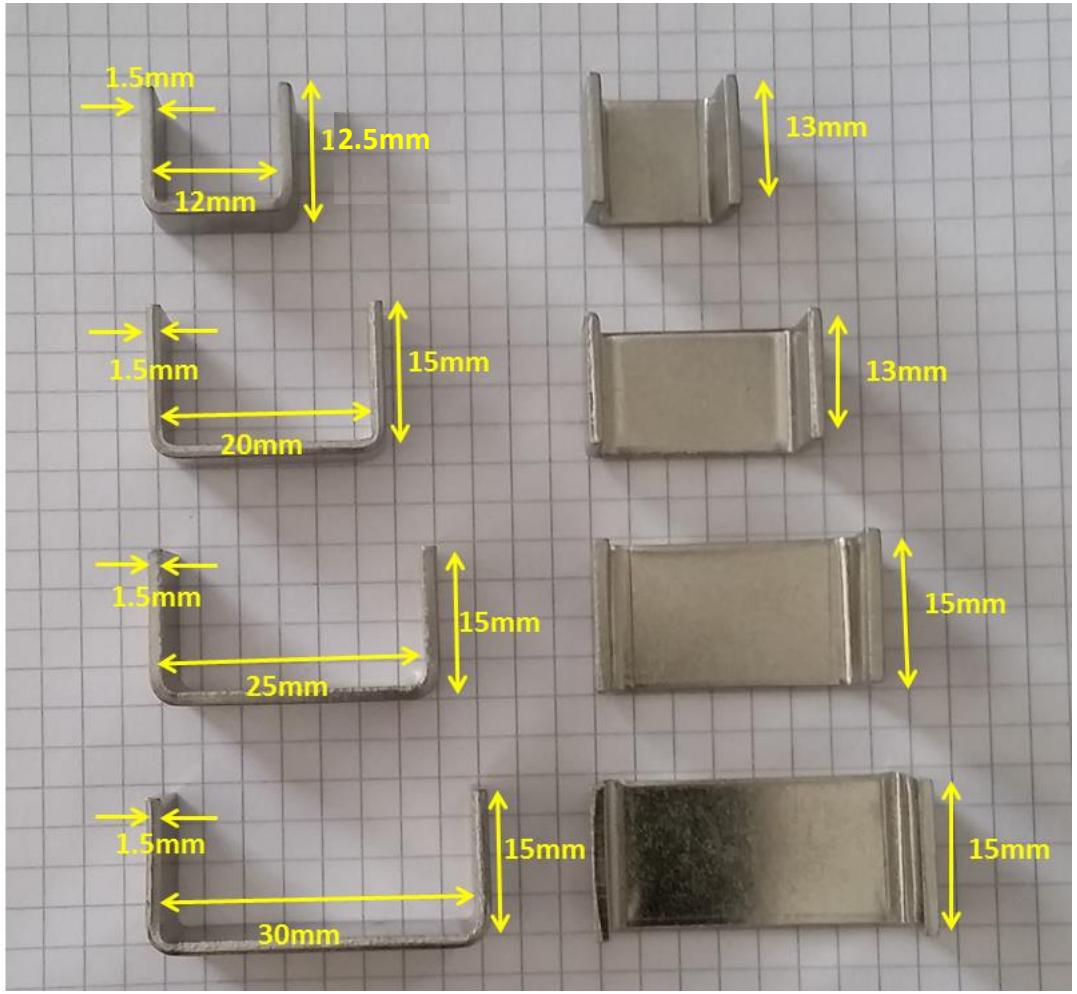
I. Standard Un-laminated U-Shields
   - U12
   - U20
   - U25
   - U30

II. Standard Laminated LU-shields
   - LU15
   - LU20
   - LU25
   - LU30

III. Standard C-cores
   - C2.5
   - C5
   - C8

I. Standard Un-Laminated U-shields Design

Dimensions



Ordering Code

U-Shield –12 – 13 – 12.5 – 1.5

U-Shield –20 – 13 – 15 – 1.5

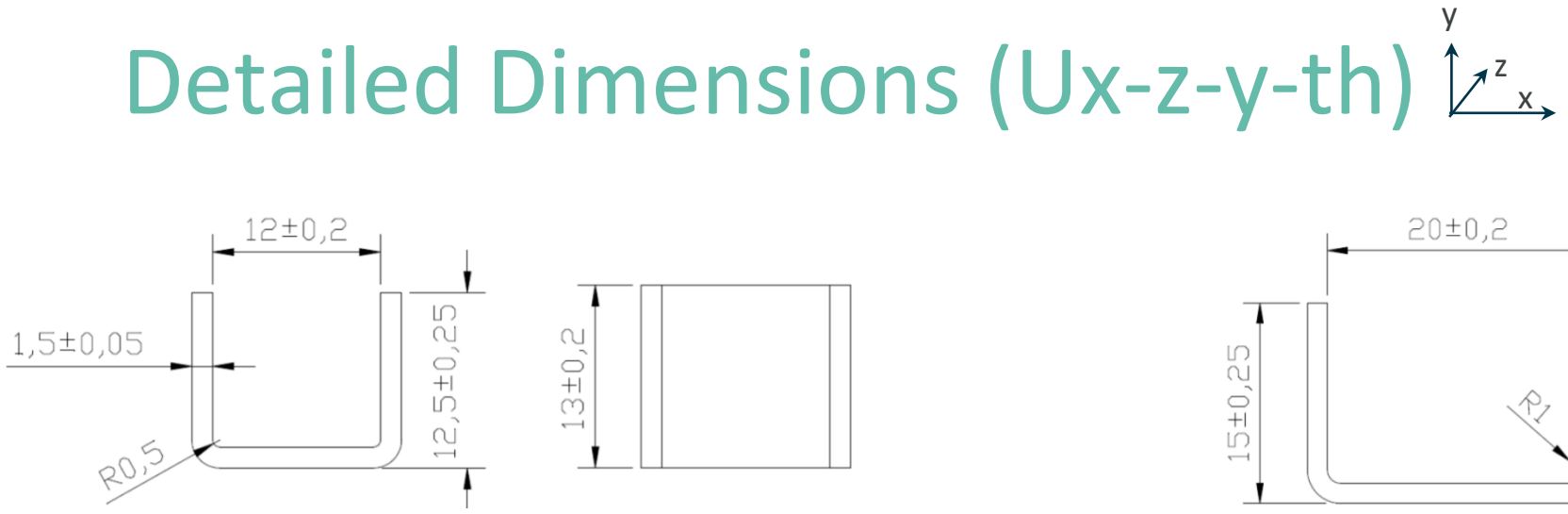
U-Shield –25 – 15 – 15 – 1.5

U-Shield –30 – 15 – 15 – 1.5

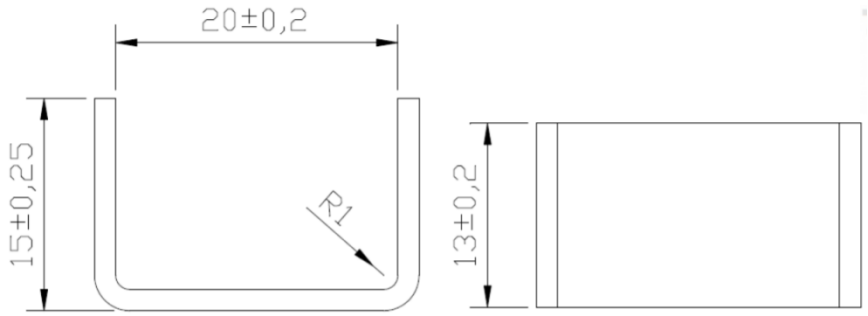
For more details about unlaminated shields

Material U-shields : NiFe

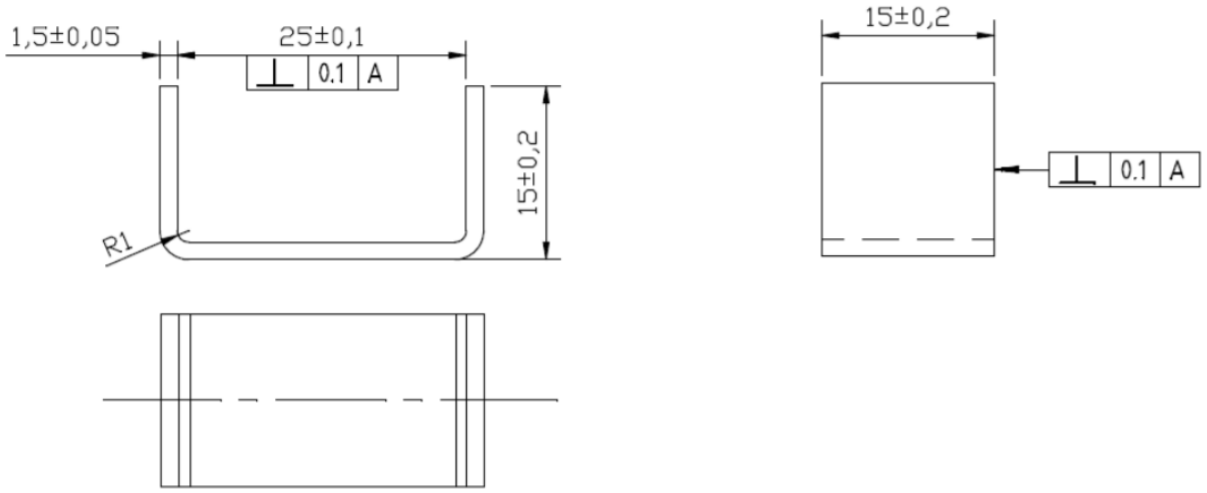
Detailed Dimensions (Ux-z-y-th)



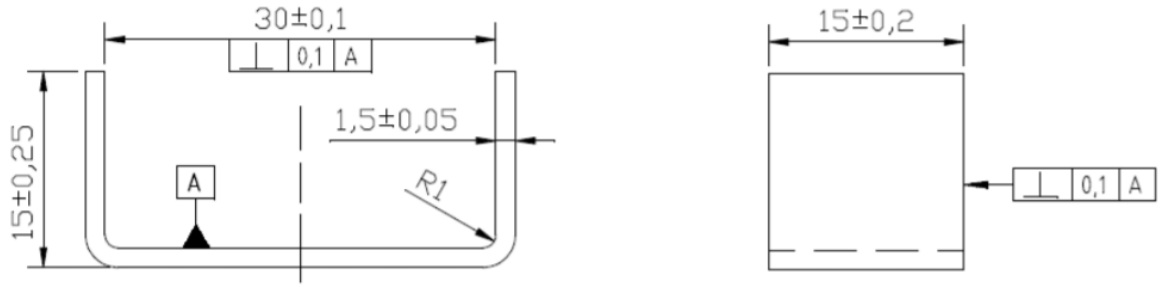
U12 – 13 – 12.5 – 1.5



U20 – 13 – 15 – 1.5

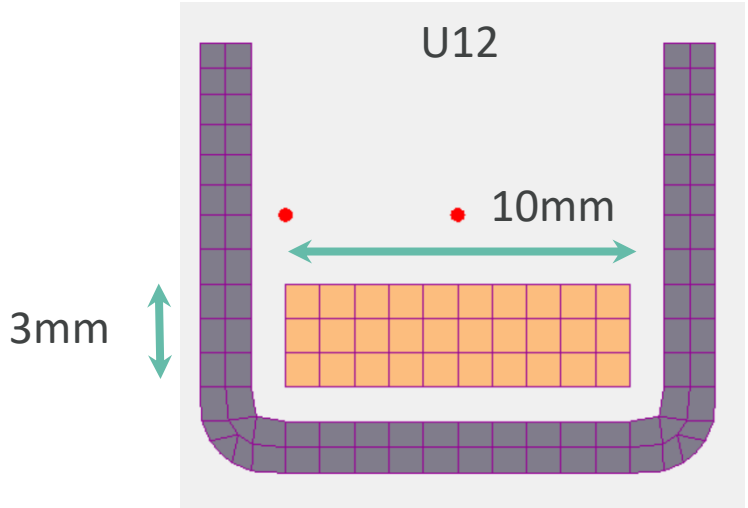


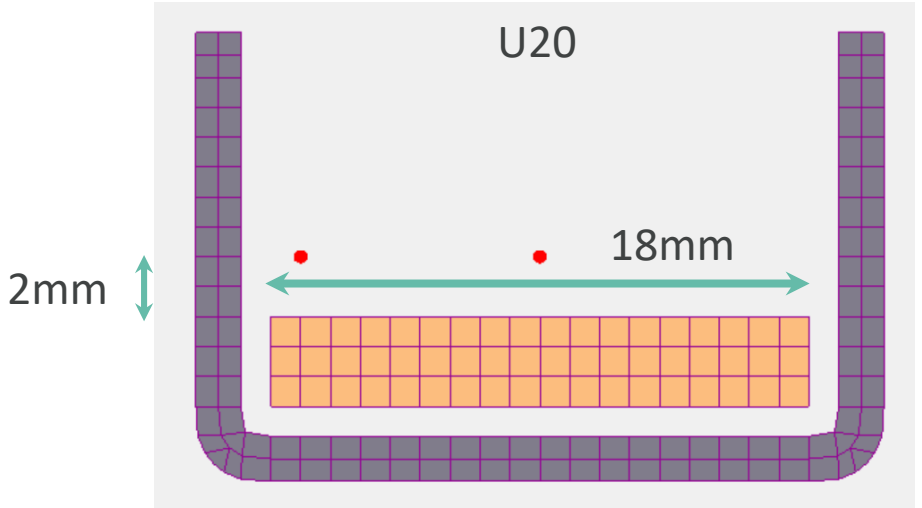
U25 – 15 – 15 – 1.5

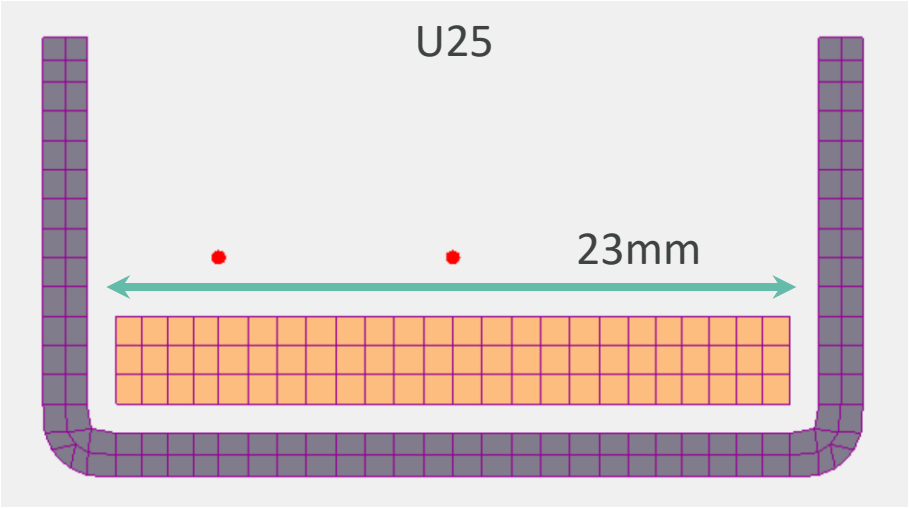


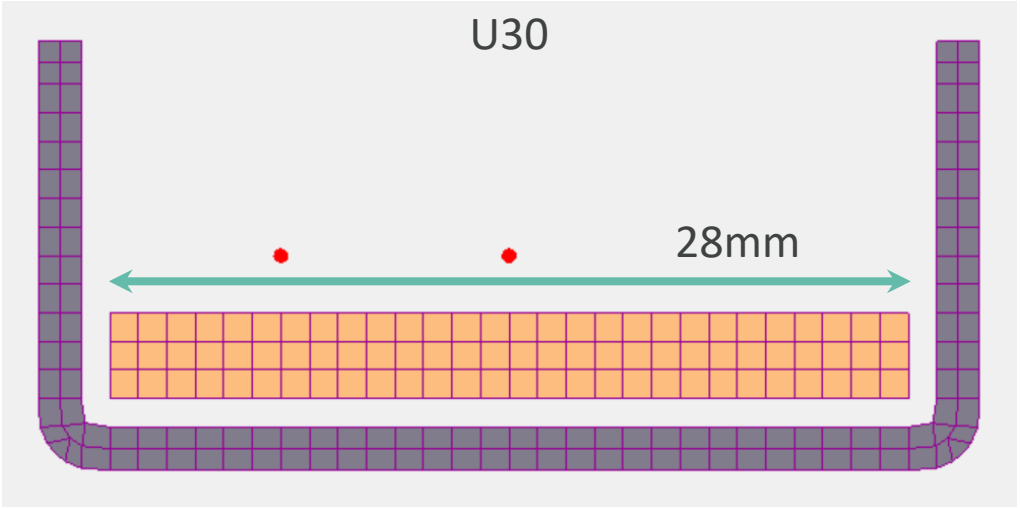
U30 – 15 – 15 – 1.5

Simulation models

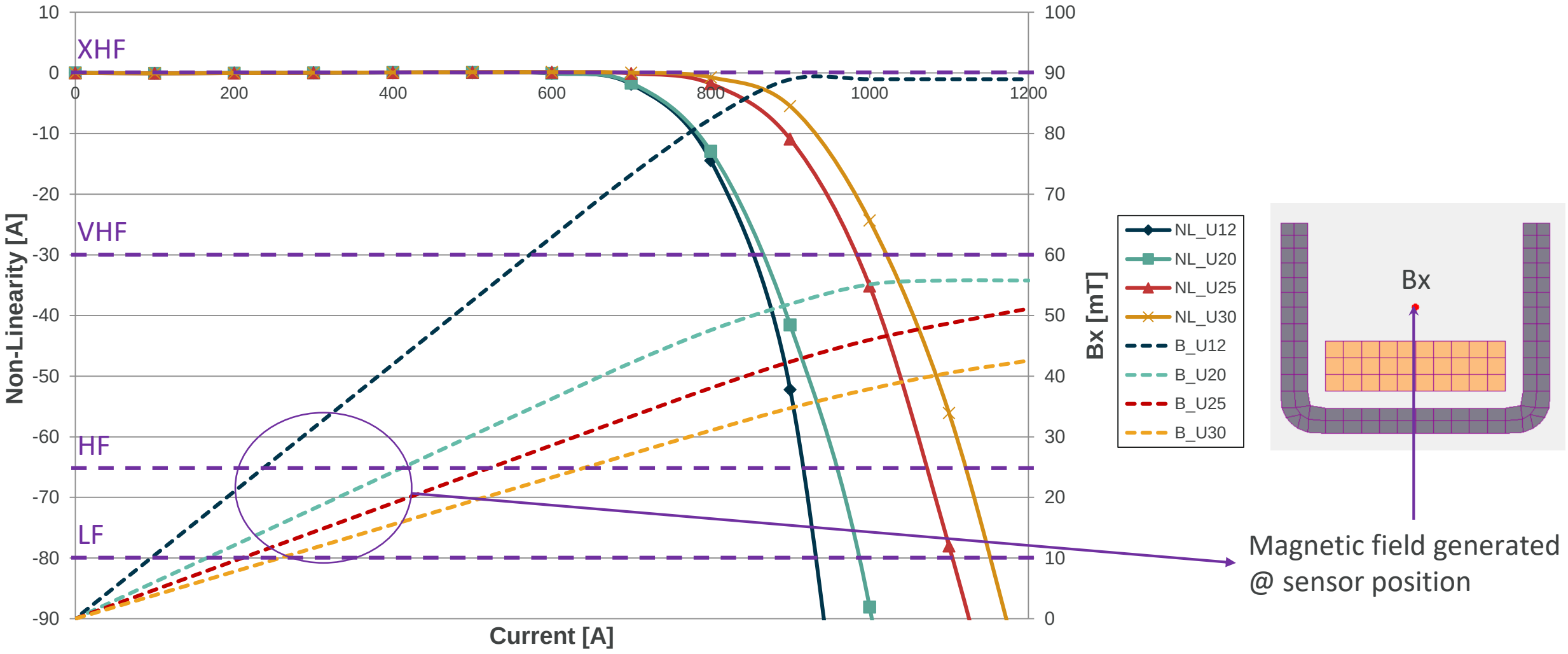




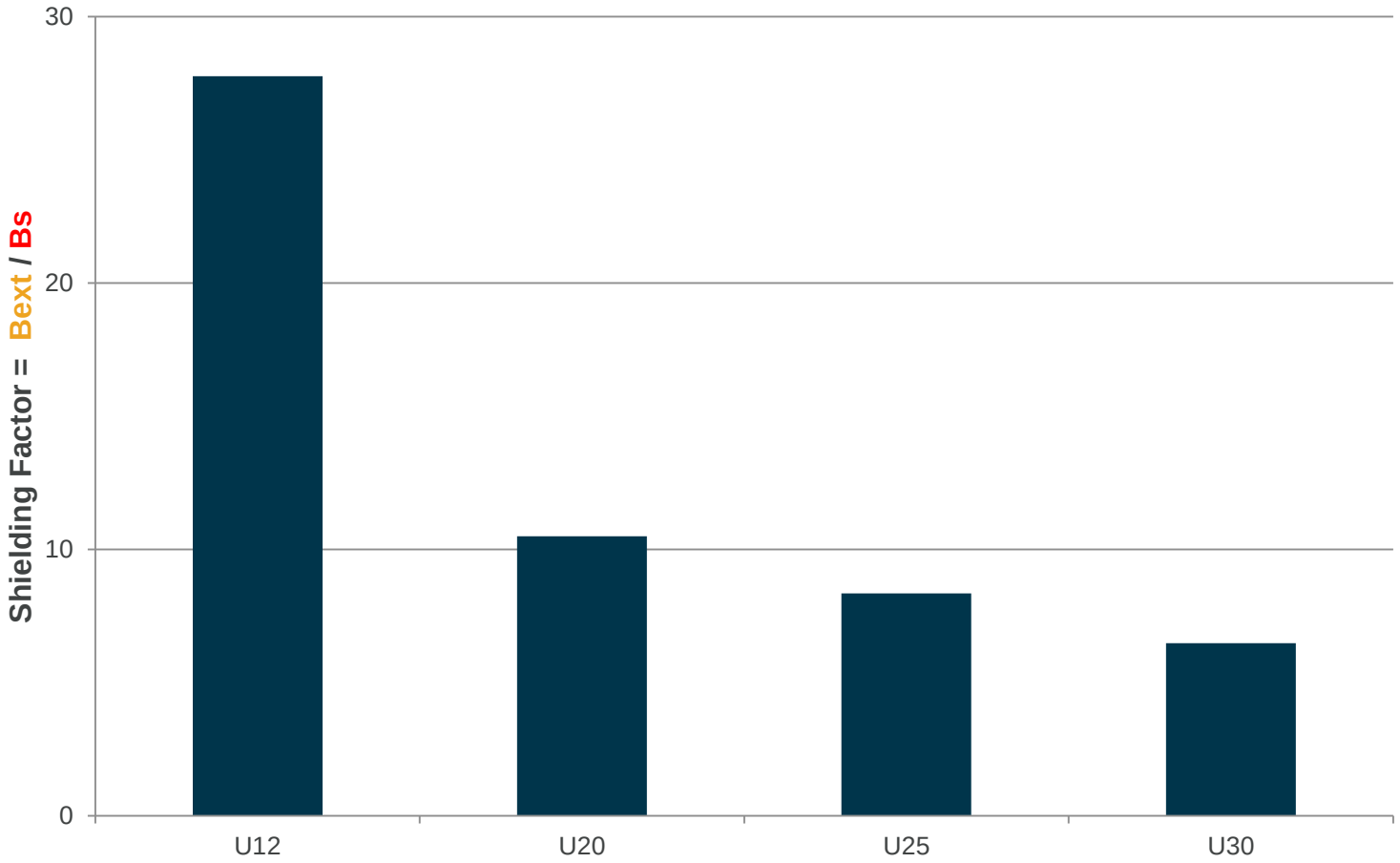


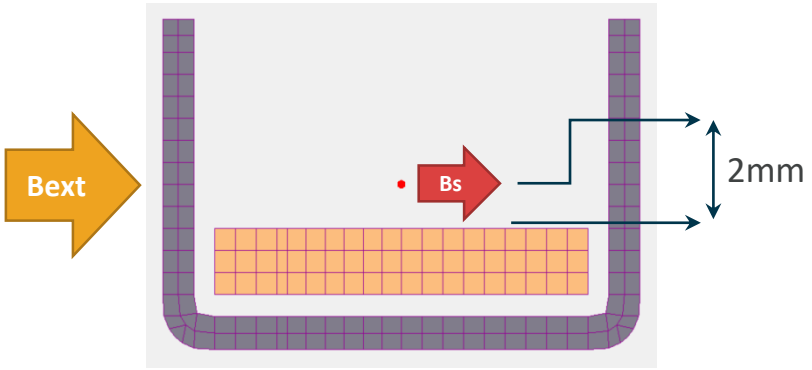


DC Simulations – Linearity and Saturation



Stray Field Immunity





- Narrower shields show a better shielding factor.
- A high shielding factor ensures a good protection against external fields and cross-talk and therefore a high S/N ratio.

II. Standard Laminated LU-shields Design

Why Laminated Shields ?

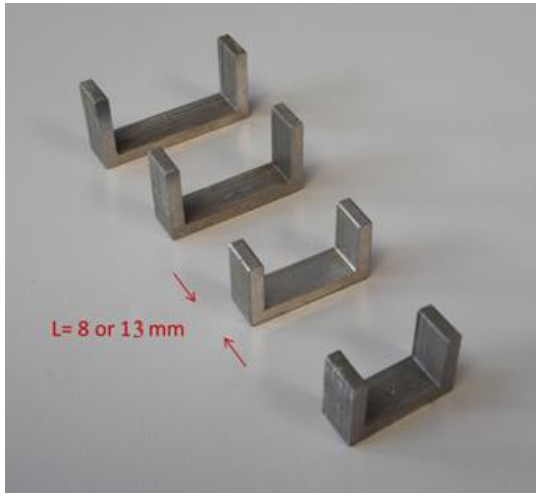
- The purpose of this presentation is to demonstrate the performances of standard laminated U shields. These shields are made of a stack of laminated ferromagnetic material (NiFe or SiFe).

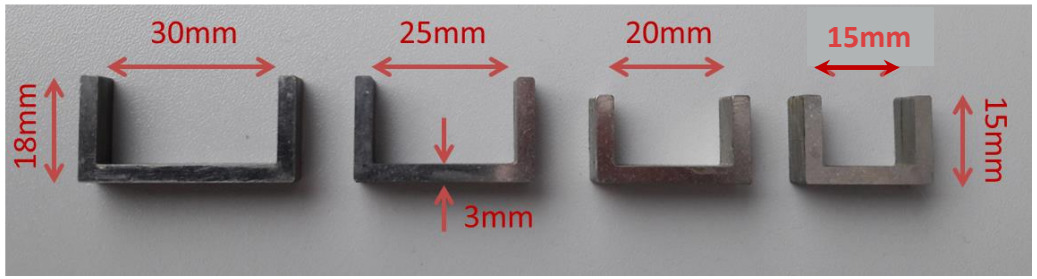
- The laminations allow reducing Eddy currents that appear in the shield when subjected to AC stimulations. Eddy currents are responsible of magnetic attenuation and increased phase delays over frequency. By reducing Eddy currents, the overall sensing solution presents an enhanced AC behavior compared to solutions including unlaminated shield.

- The laminated U shields are typically used for high-current (> 800A) inverter applications targeting high accuracy (<2deg and <5% attenuation over 0Hz to 2khz)

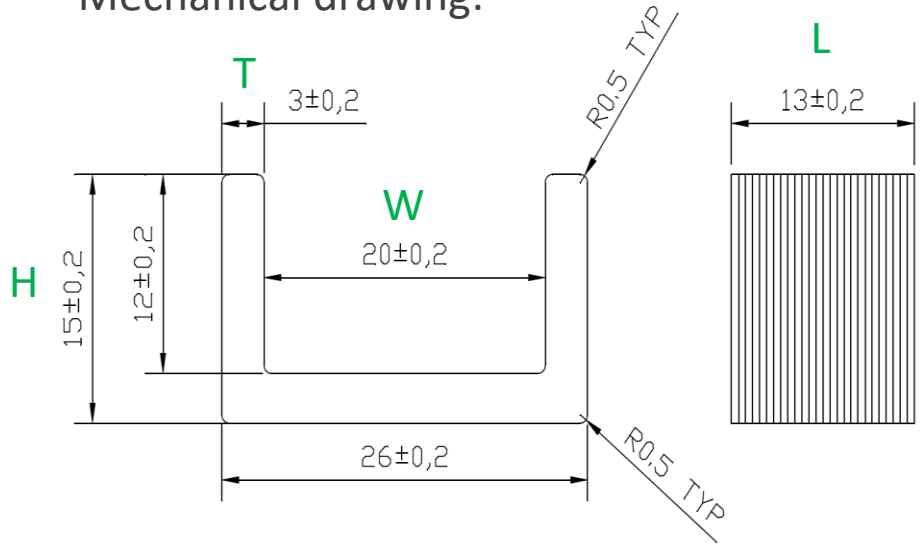
- The bus bar has also a role in the frequency response, due to eddy currents inside. Please contact us for further clarifications.

Dimensions





Mechanical drawing:

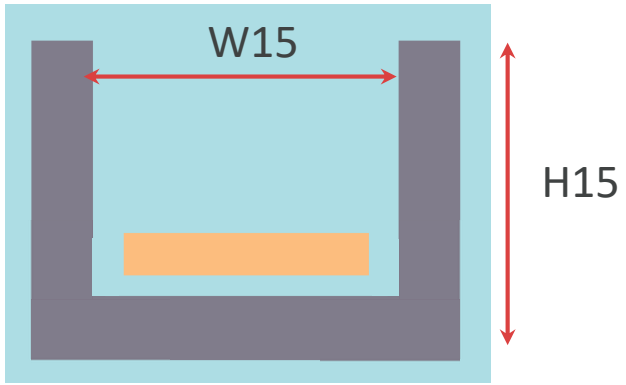


Order code examples	W	L	H	T	Type
LU20-8-15-3-NiFe	20	8	15	3	NiFe
LU20-8-15-3-SiFe	20	8	15	3	SiFe
LU20-13-15-3-NiFe	20	13	15	3	NiFe
LU20-13-15-3-SiFe	20	13	15	3	SiFe
LU25-8-18-3-NiFe	25	8	18	3	NiFe
LU25-8-18-3-SiFe	25	8	18	3	SiFe
LU25-13-18-3-NiFe	25	13	18	3	NiFe
LU25-13-18-3-SiFe	25	13	18	3	SiFe

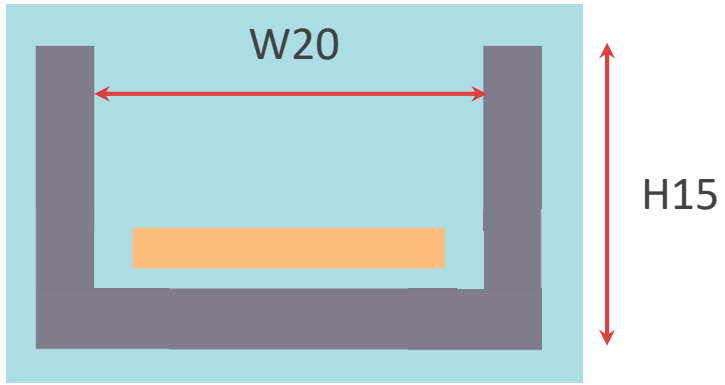
For more information about Maglab laminated Ushield: link.

Laminated Shields Models

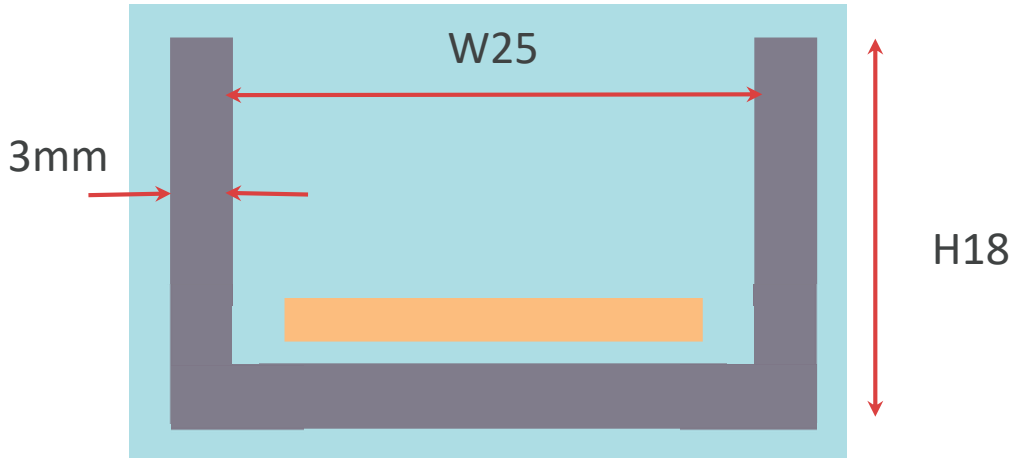
LU15 (Busbar 12x2mm)



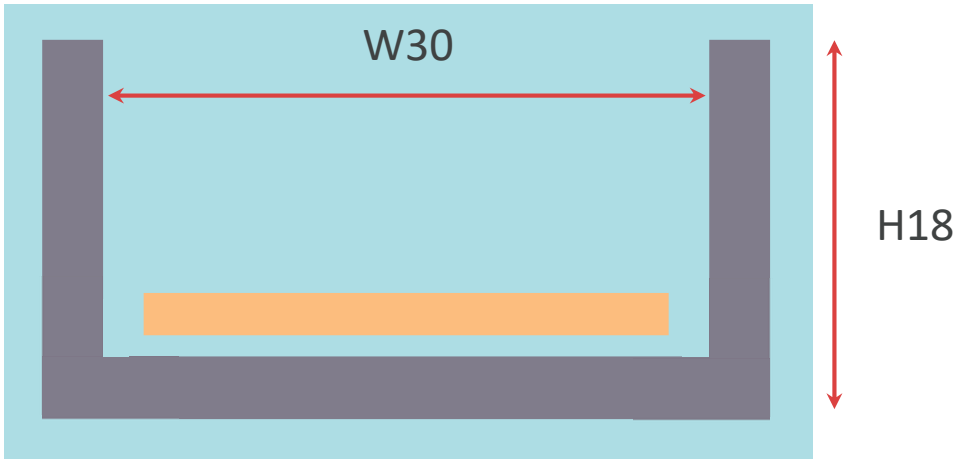
LU20 (Busbar 16x2mm)



LU25 (Busbar 20x2mm)

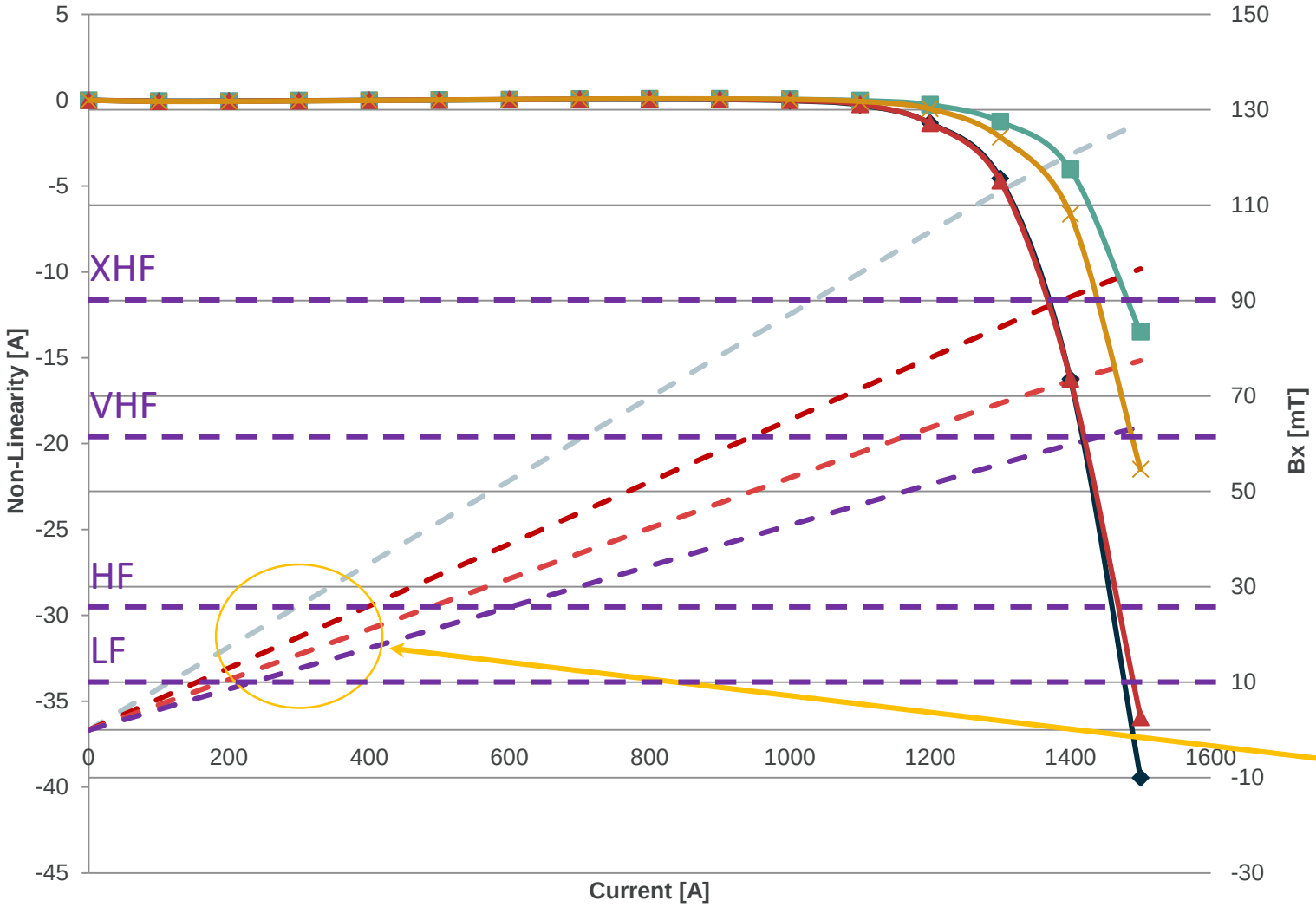


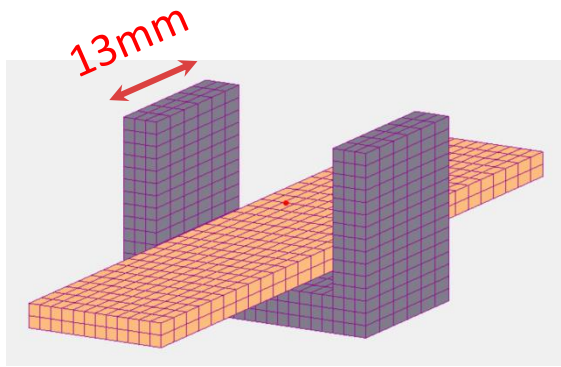
LU30 (Busbar 26x2mm)

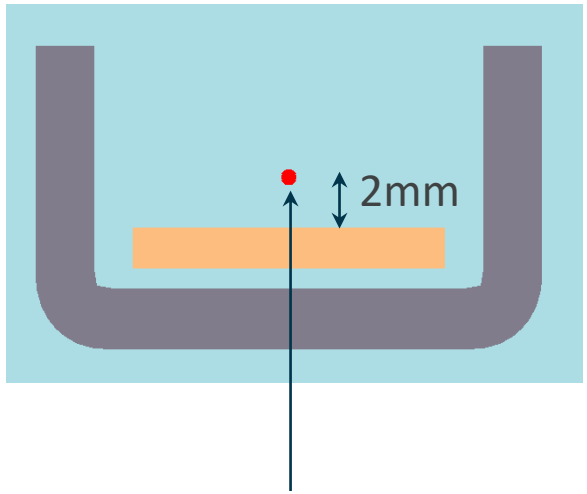


DC Simulations – Linearity and Saturation

Shield Length = 13mm, material = NiFe



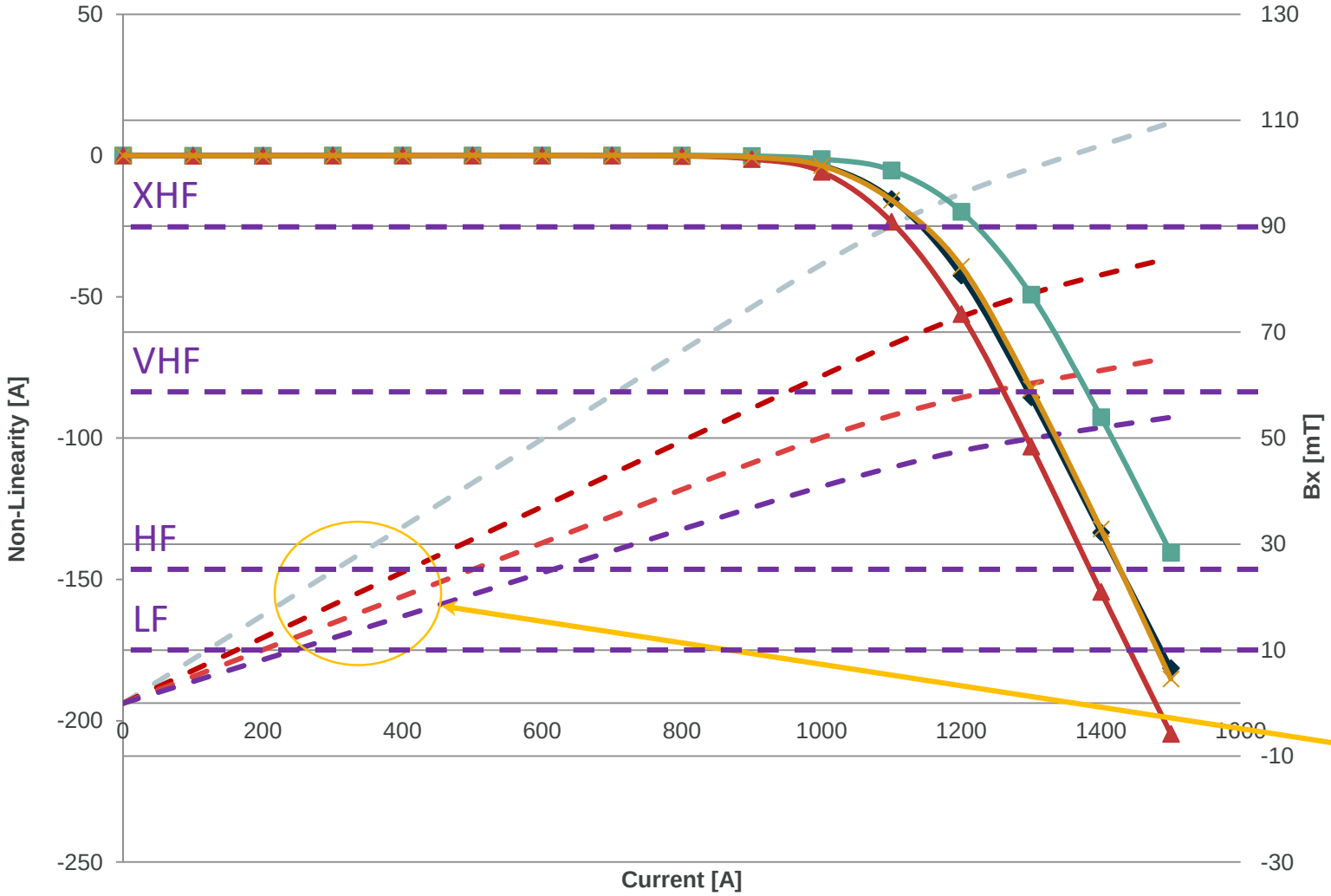


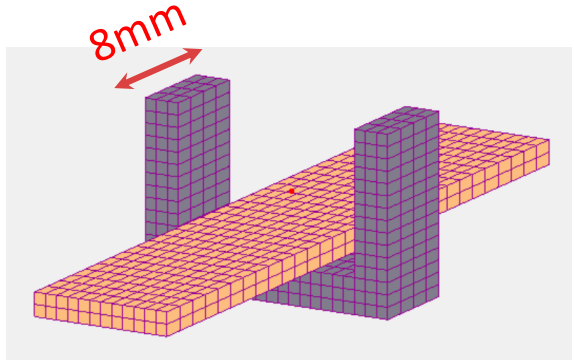


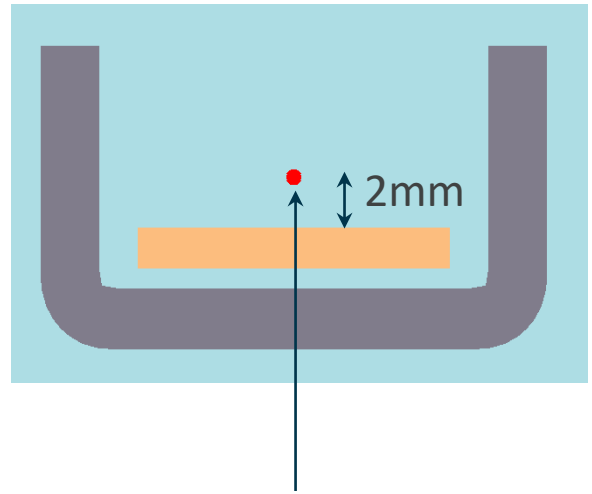
Magnetic field generated @ sensor position

DC Simulations – Linearity and Saturation

Shield Length = 8mm, material = NiFe

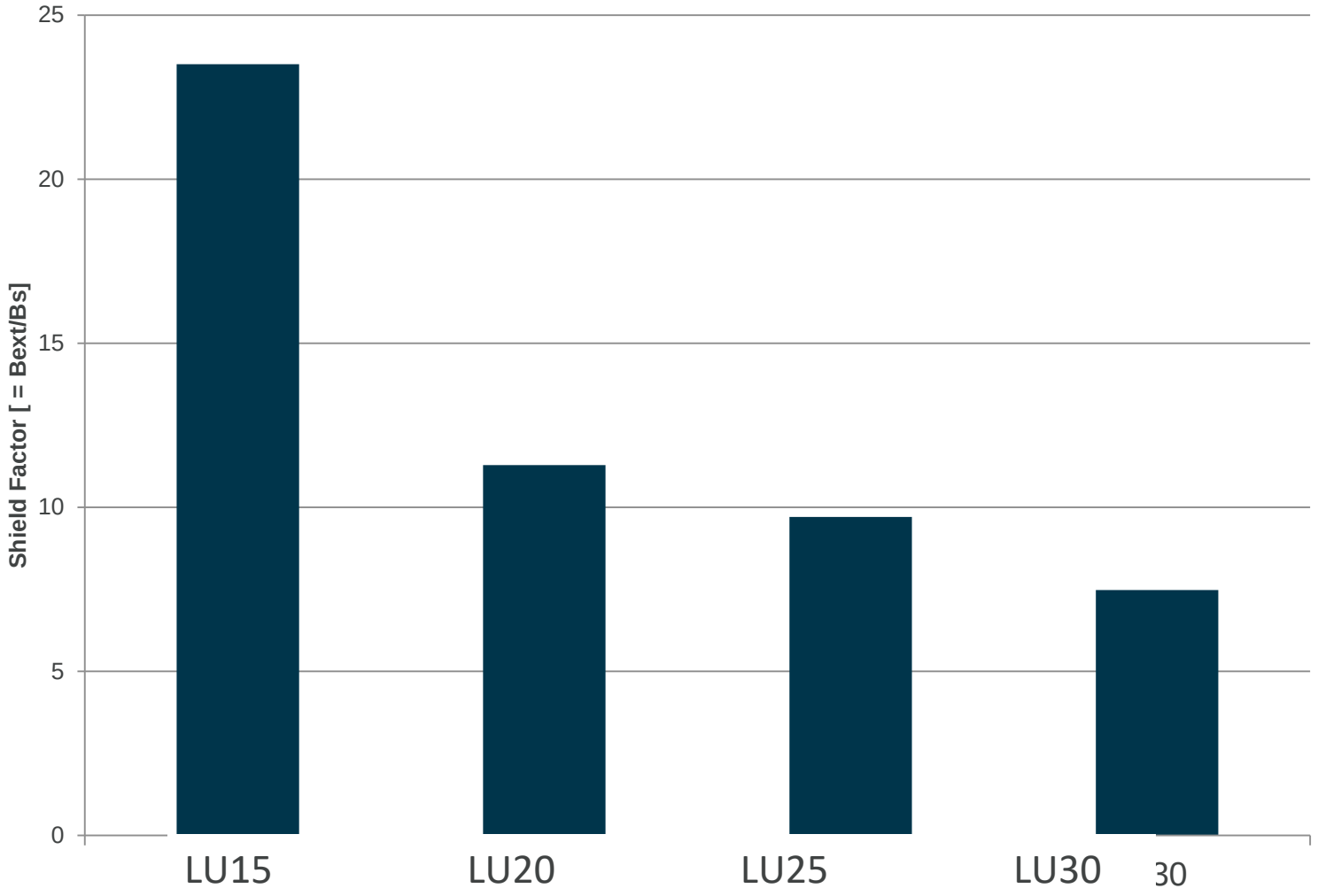


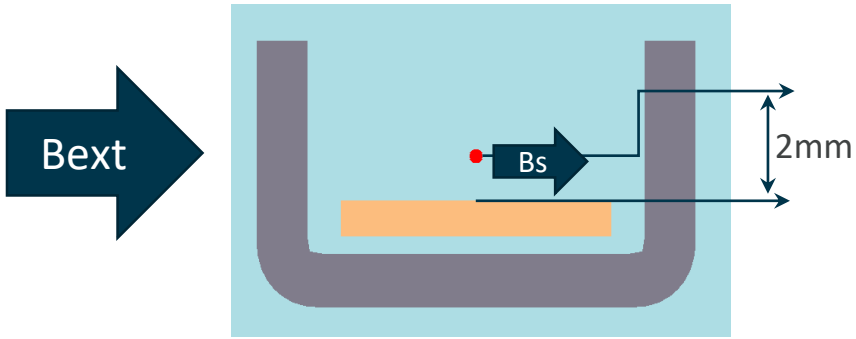




Magnetic field generated @ sensor position

Stray Field Immunity





Narrower shields shows a better shielding factor.

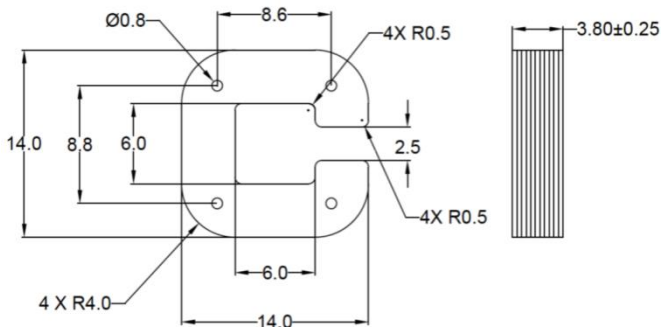
A high shielding factor ensures a good protection against external fields and cross-talk and therefore a high S/N ratio.

III. Standard C-Cores Design

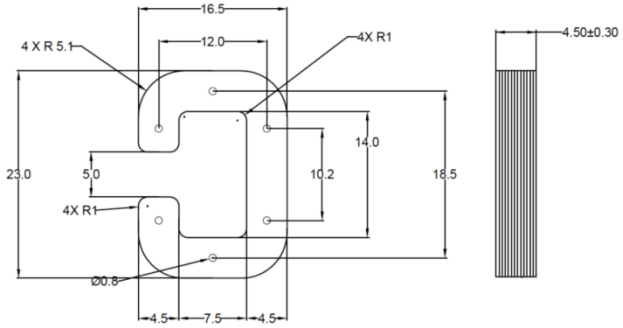
Typical Geometries

Dimensions (Cgap – thickness – length)

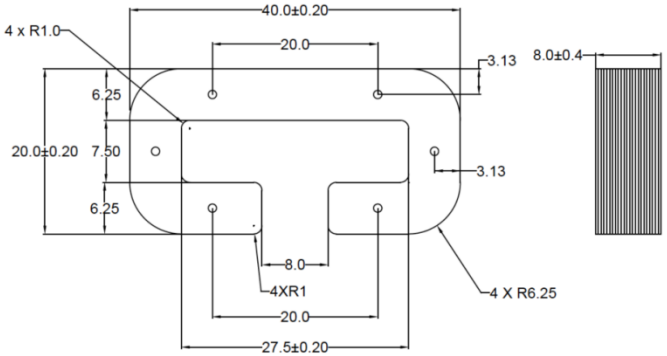
C2.5-4-3.8



C5-4.5-4.5

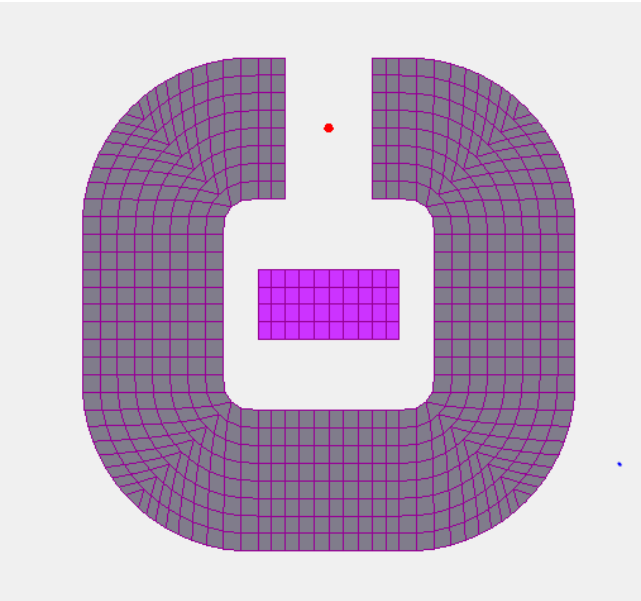


C8-6.3-8



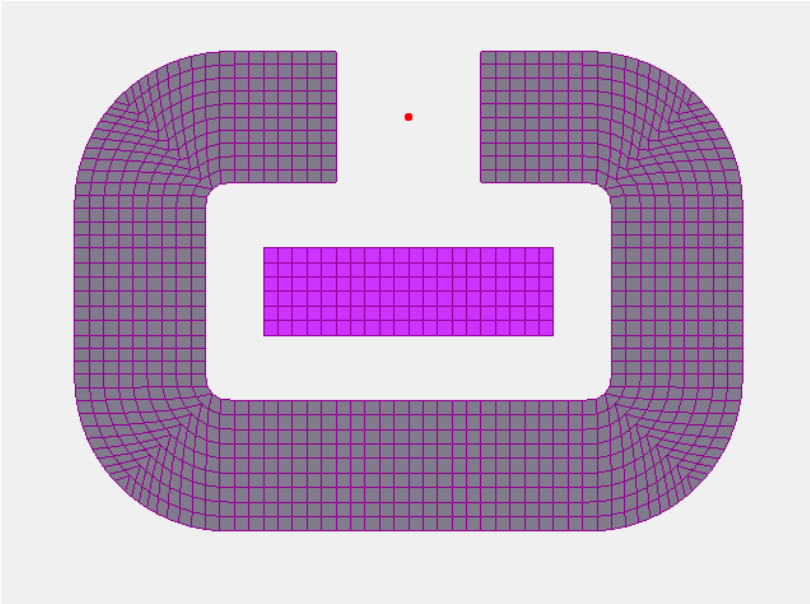
C-Cores Simulation Models

C2.5-4-4



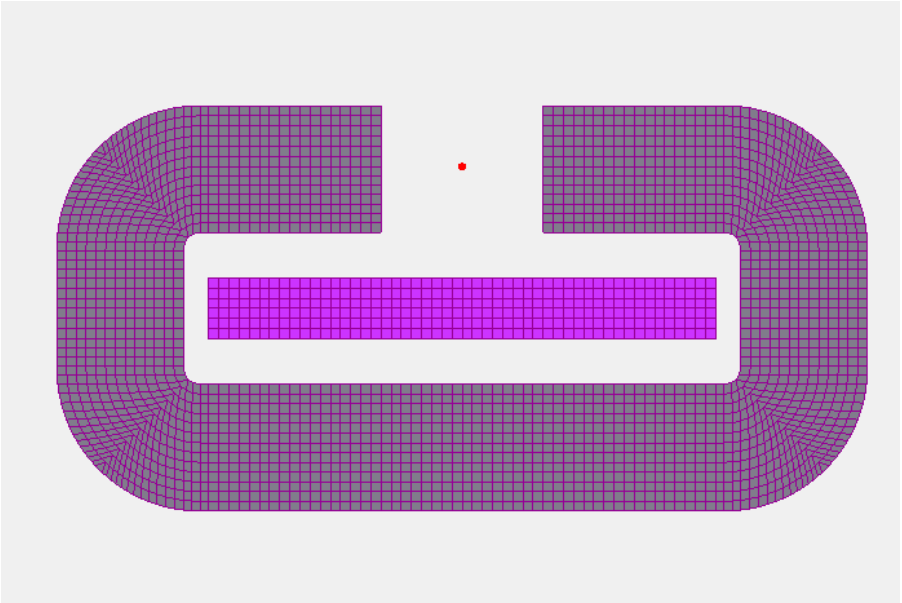
Bus-bar : 4 x 2 mm

C5-4.5-4.5



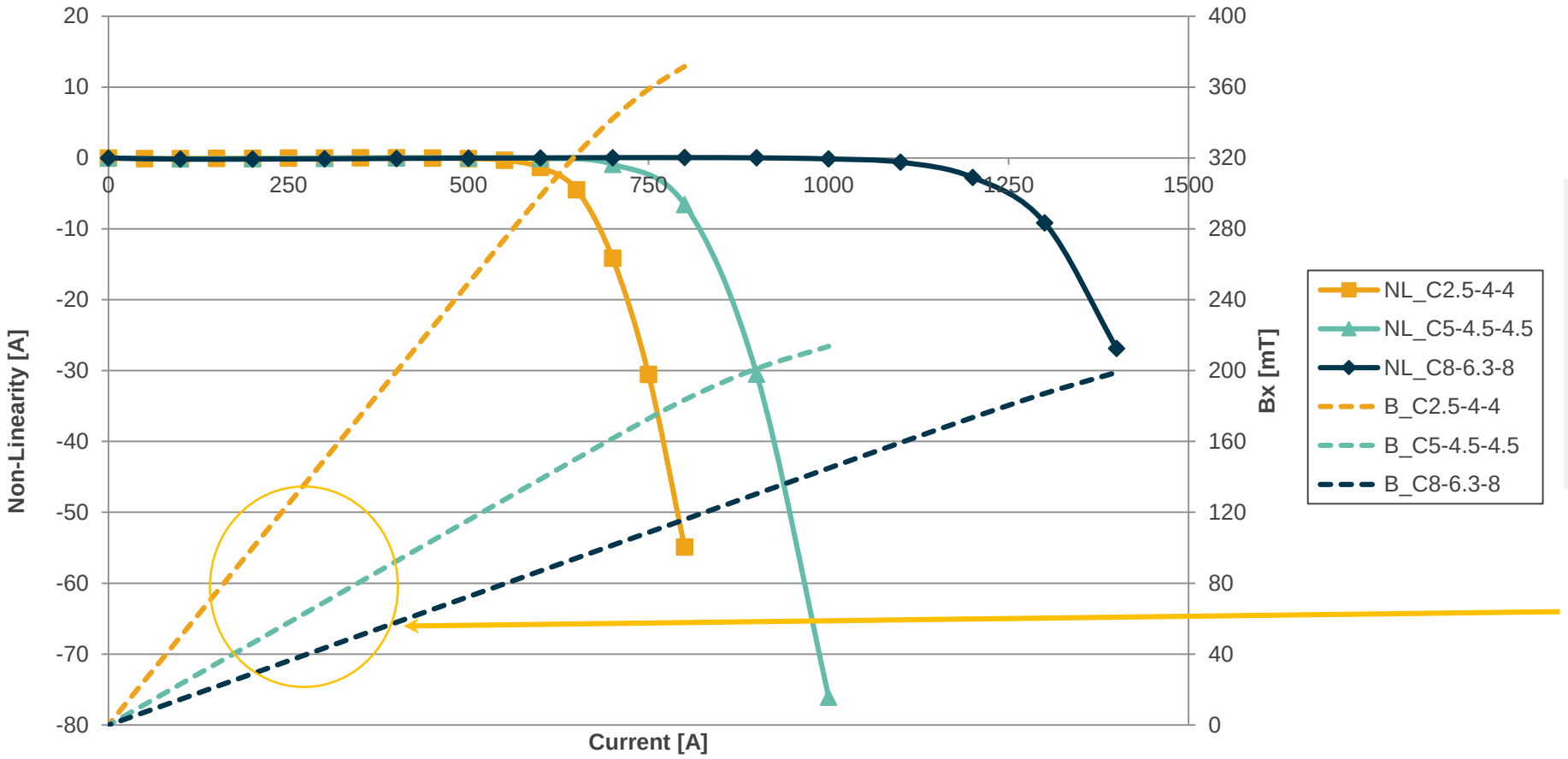
Bus-bar : 10 x 3 mm

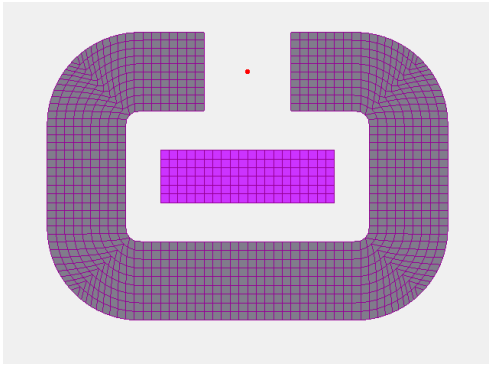
C8-6.3-8



Bus-bar : 25 x 3 mm

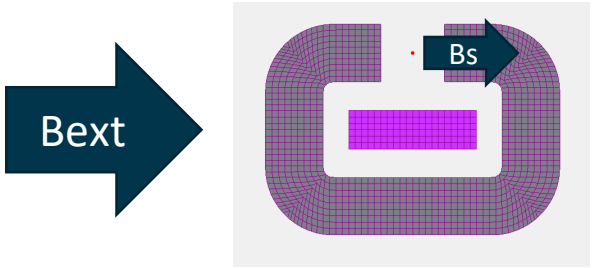
DC Performances – Linearity and Saturation

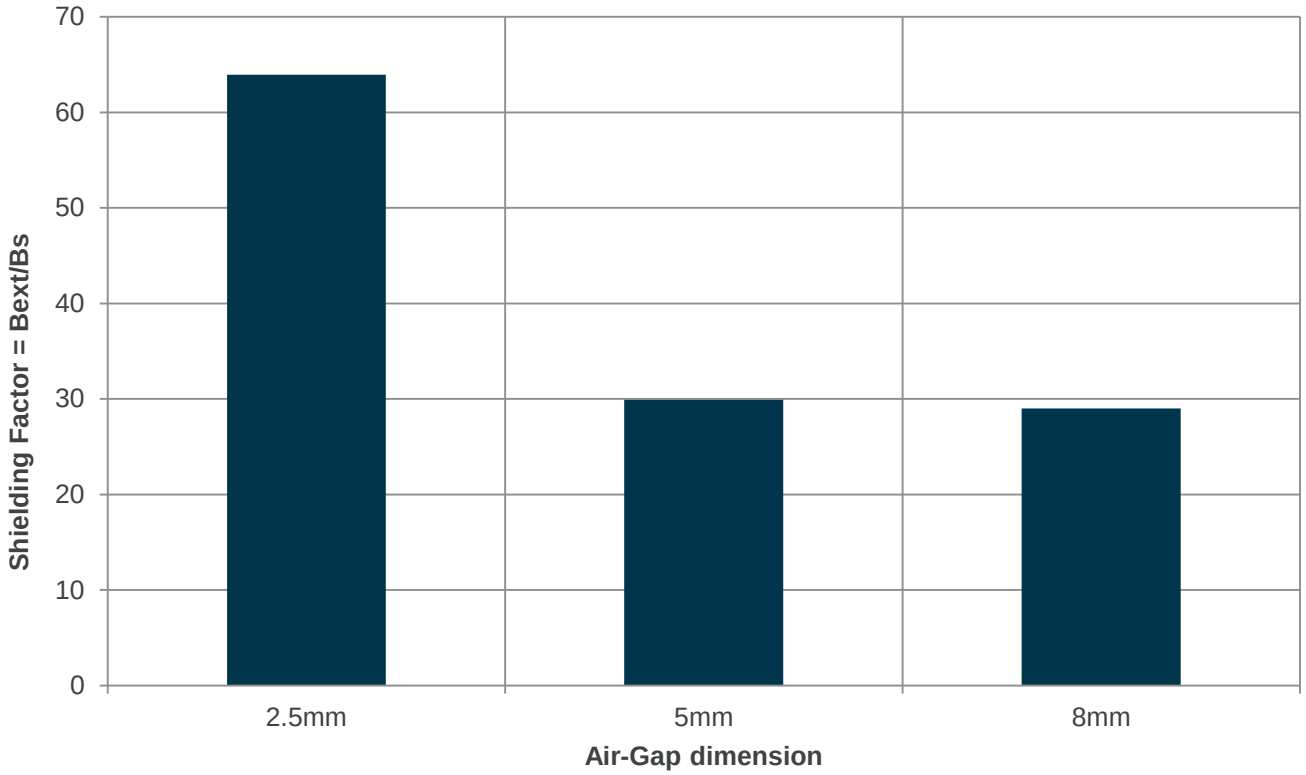




Magnetic field generated @ sensor position (middle of the airgap)

Stray Field Immunity





Narrower air-gaps show a better shielding factor.

A high shielding factor ensures a good protection against external fields and cross-talk and therefore a high S/N ratio.

For additional questions, please fill and submit the following technical inquiry form: https://www.melexis.com/en/contact/technical-inquiry

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