

Shields for Current Sensing Applications

Rectangular Shield Examples

1. Scope

This application note presents rectangular shield examples which are used for planar contactless current sensing. Shield material properties are given for different alloy compositions.

2. Shield Examples



3. Shield Materials

Soft magnetic materials are alloys of nickel and iron which are used in magnetic field and current sensing applications.

The materials are distinguished by their nickel grade:

- 80% Ni (Mu metal) low saturation flux density
- 48% Ni medium saturation flux density
- 37% Ni high saturation flux density

The grade to be used depends on the application.

4. Magnetic Material Properties

Superior material characteristics and annealing processes lead to very high linearity $NL < 0.2\%FS$.

The measurements are made with ring specimens of outer diameter $D_o=36mm$ and inner diameter $D_i=25mm$ and thickness $T=0.35mm$, after optimum treatment of 4 hours at $1170^\circ C$ in dry hydrogen followed by cooling at $200^\circ C/h$.

4.1 Magnetic Properties of 80% Ni Grade

Parameter	Typical Value	Unit
Saturation Induction Bs	0.76	T
Remnant Induction Br	0.5	T
Coercive Field Hc	0.6	A/m
Max. Permeability (DC)	350000	a.u.
Max. Permeability (60Hz)	95000	a.u.

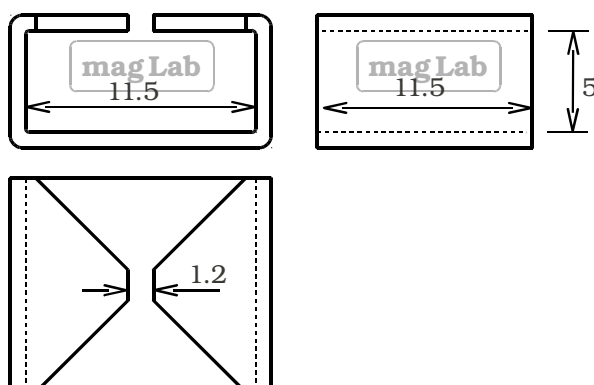
4.2 Magnetic Properties of 48% Ni Grade

Parameter	Typical Value	Unit
Saturation Induction Bs	1.3	T
Remnant Induction Br	0.4	T
Coercive Field Hc	6	A/m
Max. Permeability (DC)	30000	a.u.
Max. Permeability (60Hz)	30000	a.u.

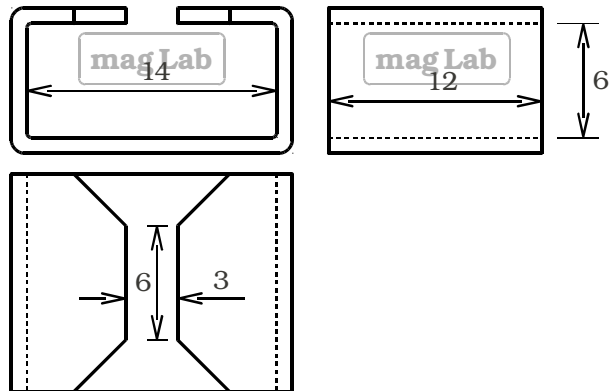
4.3 Magnetic Properties of 36% Ni Grade

Parameter	Typical Value	Unit
Saturation Induction Bs	1.5	T
Remnant Induction Br	1.1	T
Coercive Field Hc	2.8	A/m
Max. Permeability (DC)	190000	a.u.
Max. Permeability (60Hz)	54000	a.u.

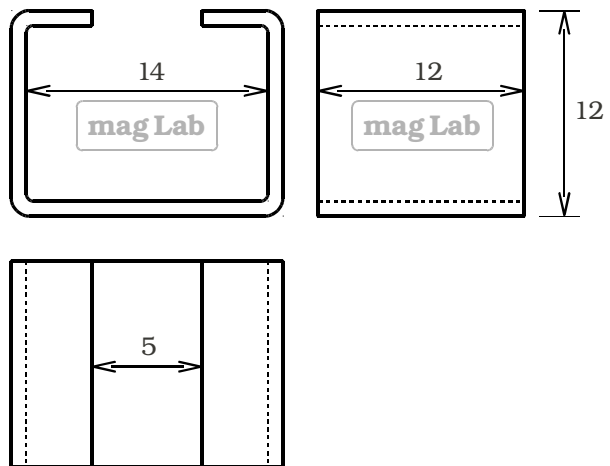
5. Geometry R1



6. Geometry R2



7. Geometry R3



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