Appendix E

Comparison of Hall Effect and MR Technologies

Description

The following table compares the Hall effect in silicon to magnetoresistance in a nickel-iron thin film.

1. Both technologies are compatible with integrated circuit processing and may be used to make totally integrated single-chip sensors.
2. MR is roughly 200 times more sensitive than the Hall effect in silicon. Furthermore, it is adjustable through selection of film thickness and line width.
3. The Hall effect is highly linear with no saturation effects out to extremely high fields.
4. The Hall effect occurs for fields applied perpendicular to the plan of the all element. The magnetoresistive effect occurs in the plane of the thin film perpendicular to the long direction of the resistive elements.
5. Both effects occurs for time-invariant fields and may be used to construct zero speed sensors.

Magnetoresistive vs. Hall Effect

	Hall	MR
Process Technology	Silicon IC	NiFe Thin Film
Sensitivity	10uv/v/g	2 mv/v/g
Saturation Field	None	10 - 100g
Linearity	< 1%	$COS^2 \Theta$
Sensitive Axis	Perpendicular to plane of chip	Parallel to plane of chip
Output for Constant Field	Yes	Yes