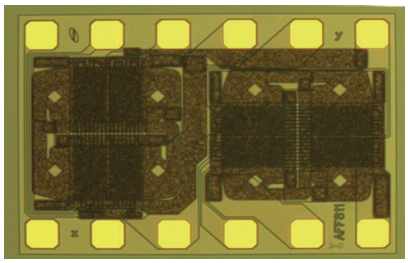
SENSITEC
KÖRBER SOLUTIONS

DATA SHEET

AFF811

MagnetoResistive Field Sensor



The AFF811 is a low noise magnetic field sensor based on the Anisotropic MagnetoResistive (AMR) effect. This sensor is suitable for high-end consumer applications with clearly superior performance compared to typical Hall effect based solutions.

The sensor contains two Wheatstone bridges with a common power supply. This allows the measurement of two magnetic field components (X and Y) in parallel. Each bridge is configured with a flip coil for offset correction. This measurement principle also reduces the temperature coefficient of the offset by a factor of 100.

This sensor is ideally suited for the detection of weak magnetic fields including the earth magnetic field.

Product Overview

Article Description	Package	Delivery Type
AFF811AAA-AB	Undiced wafer [1]	Waferbox

[1] Minimum order quantities apply.

Quick Reference Guide

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{CC}	Supply voltage	-	5.0	9.0	V
I_F	Flip current (recommended) [2]	+400	-	-	mA
S	Sensitivity (in range ±160 A/m) [2]	7.0	10.0	13.0	mV/V kA/m
R_S	Sensor resistance	0.58	0.68	0.78	kΩ
R_F	Flip coil resistance	1.0	1.25	1.5	Ω

[2] Applicable for both field components (X and Y).

Absolute Maximum Ratings

In accordance with the absolute maximum rating system (IEC60134).

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply voltage	-9.0	+9.0	V
I_{Fmax}	Maximal flip current [3]	-1.0	+1.0	A
T_{amb}	Ambient temperature	-40	+125	°C

[3] 10 µs pulse, 1000 µs pause.

Stresses beyond those listed under "Absolute maximum ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Features

- Cost effective sensor chip for high volume applications
- Based on the Anisotropic MagnetoResistive (AMR) effect
- Contains two Wheatstone Bridges
- Integrated flip coil
- Temperature range from -40 °C to +125 °C

Advantages

- Very low chip size
- High sensitivity
- Wide range of magnetic field strength
- Low flip coil resistance
- Very good signal to noise ratio
- Low hysteresis

Applications

- Compass
- Navigation Systems
- Battery powered applications
- Magnetometry
- Measurement of terrestrial magnetic field
- Traffic detection

ESD

RoHS-Compliant www.sensitec.com

Magnetic Data

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
H_{ext}	Operating magnetic field range		-600	-	+600	A/m

Electrical Data of MR-Bridge

T_{amb} = 25 °C; V_{CC} = 5 V; unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{CC}	Supply voltage		-	5.0	9.0	V
S	Sensitivity [1]	In the operating range of ±160 A/m	7.0	10.0	13.0	mV/V/kA/m
ΔS	Deviation of the sensitivity directions [2]	Between X– and Y-direction	-5.0	-	+5.0	%
TC_S	Temperature coefficient of Sensitivity [3]		-0.36	-0.42	-0.48	%/K
R_B	Bridge resistance [1], [4]		1.15	1.35	1.55	kΩ
ΔR_B	Deviation of the bridge resistances [5]	Between X– and Y-direction	-2.0	1.0	2.0	%
TC_{RB}	Temperature coefficient of R_B [6]		0.25	0.28	0.31	%/K
V_{off}	Offset voltage per V_{CC} [1]		-0.6	-	+0.6	mV/V
ΔV_{off}	Deviation of the offsets [7]	Between X– and Y-direction	-0.6	-	+0.6	mV/V
H_{Stab}	Stability of offset [1], [8]		-	0.2	1.0	A/m

[1] Applicable for both field components (X and Y)

[2] $\Delta S = 200\% \cdot \frac{S_X - S_Y}{S_X + S_Y}$

[3] $TCS = 100 \cdot \frac{S_{(T2)} - S_{(T1)}}{S_{(T1)} \cdot (T_2 - T_1)}$ with T_1 = 25 °C; T_2 = 85 °C

[4] Bridge resistance between pads 11 and 12 for X-direction and pads 4 and 8 for Y-direction

[5] $\Delta R_B = 200\% \cdot \frac{R_{BX} - R_{BY}}{R_{BX} + R_{BY}}$

[6] $TC_{RB} = 100 \cdot \frac{R_{B(T2)} - R_{B(T1)}}{R_{B(T1)} \cdot (T_2 - T_1)}$ with T_1 = 25 °C; T_2 = 85 °C

[7] $\Delta V_{offs} = V_{offsX} - V_{offsY}$

[8] Standard deviation of V_{offs} measured after each flip pulse in relation to the sensitivity

Electrical Data of Flip Coils

T_{amb} = 25 °C; V_{CC} = 5 V; unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_F	Flip current (recommended)	1 µs on, 1 ms off	+400	-	-	mA
t_{IF}	Flip pulse duration		-	1.0	2.0	µs
R_F	Flip coil resistance [9]		1.0	1.25	1.5	Ω
ΔR_F	Deviation of the flip coil resistances [10]		-10.0	-4.0	+10.0	%
TC_{RF}	Temperature coefficient of R_F [11]		0.23	0.28	0.33	%/K

[9] Applicable for both field components (X and Y)

[10] $\Delta R_F = 200\% \cdot \frac{R_{FX} - R_{FY}}{R_{FX} + R_{FY}}$

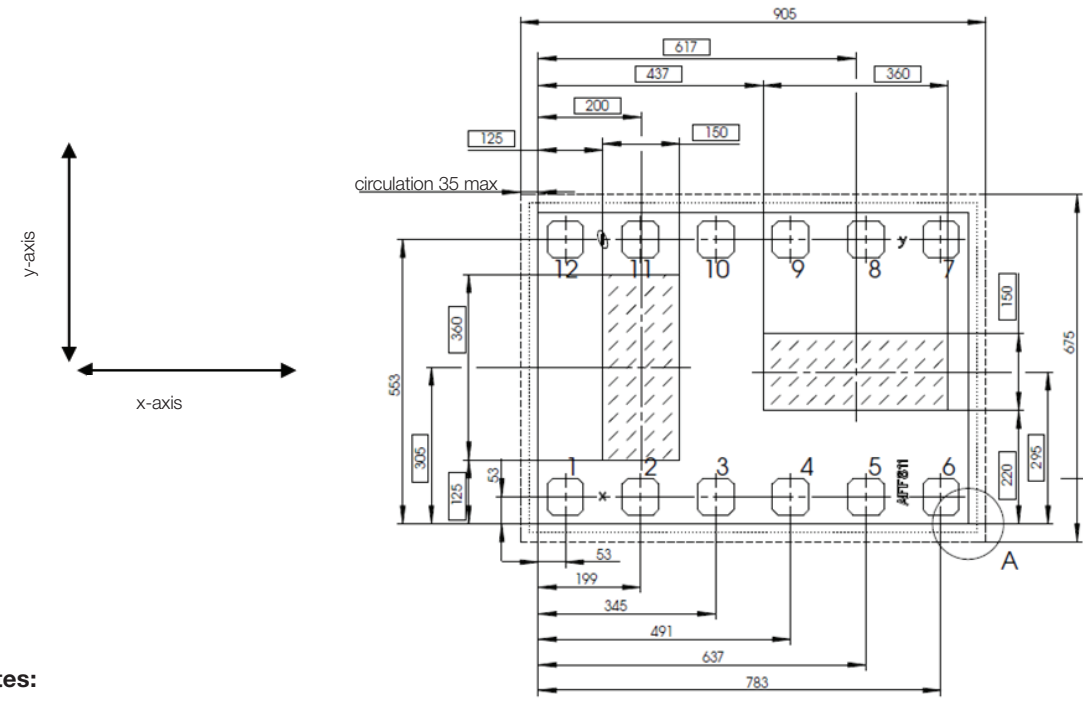
[11] $TC_{RF} = 100 \cdot \frac{R_{F(T2)} - R_{F(T1)}}{R_{F(T1)} \cdot (T_2 - T_1)}$ with T_1 = 25 °C; T_2 = 85 °C

Pad Layout

Pin	Symbol	Parameter
1	NC	Not connected
2	NC	Not connected
3	GND	Ground
4	$+V_{Oy}$	Positive output voltage Y
5	$-I_{Fy}$	Flip coil current Y direction
6	$+I_{Fy}$	Flip coil current Y direction

Pin	Symbol	Parameter
7	V_{CC}	Power supply
8	$-V_{Oy}$	Negative output voltage Y
9	$-I_{Fx}$	Flip coil current X direction
10	$+I_{Fx}$	Flip coil current X direction
11	$-V_{Ox}$	Negative output voltage X
12	$+V_{Ox}$	Positive output voltage X

Dimensions



Notes:

All dimensions in µm.

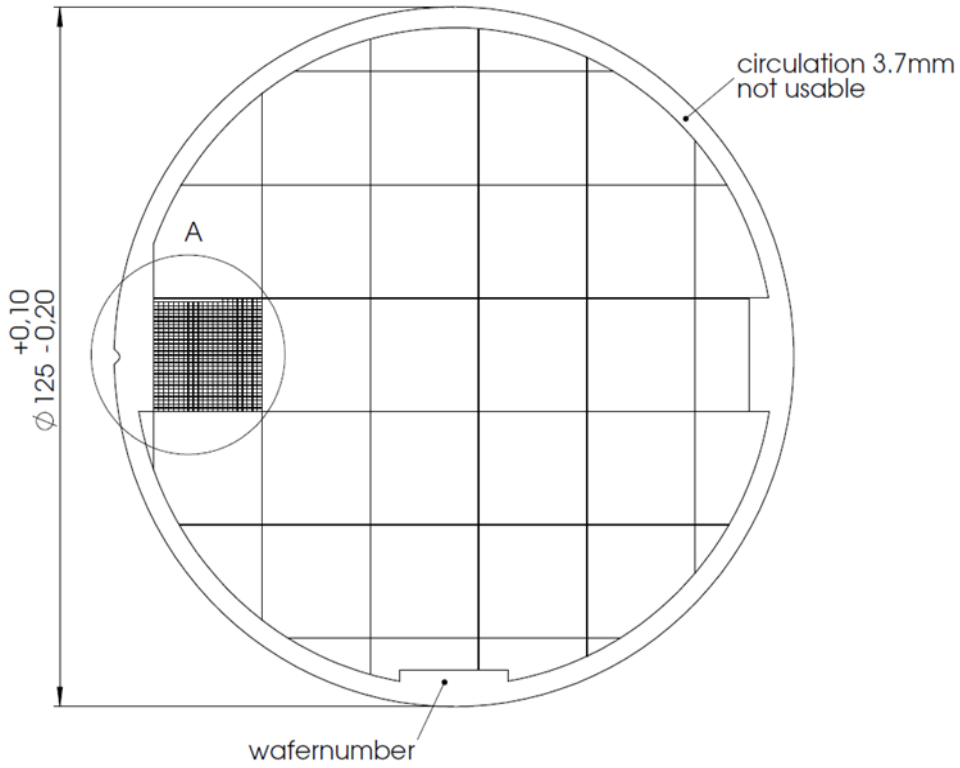
The dashed area tags the active chip area, damages not permitted.

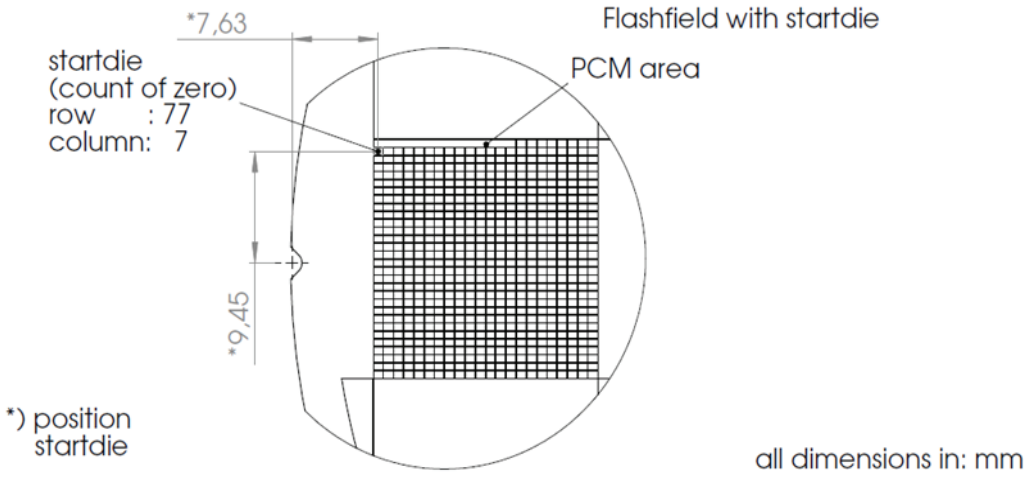
Fig. 1: Chip outline.

Data for Packaging and Interconnection Technologies

Parameter	Value	Unit
Chip area undiced wafer	(0.905 ± 0.001) x (0.675 ± 0.001)	mm
Chip thickness wafer	625 ± 25 (other thickness available on request)	µm
Pad size	(70 x 70)	µm
Pad pitch	146	µm
Pad thickness	400	nm
Pad material	Au	-

Wafer Layout





A detailed simplified ink map is available on request. Total number of potential good dies on wafer: 16891

Fig. 2: Wafer layout AFF811.

General Information

Product Status

Article	Status
AFF811AAA-AB	The product is in series production.
Note	The status of the product may have changed since this data sheet was published. The latest information is available on the internet at www.sensitec.com.

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These products are not qualified for use in life support appliances, aeronautical applications or devices or systems where malfunction of these products can reasonably be expected to result in personal injury.

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