

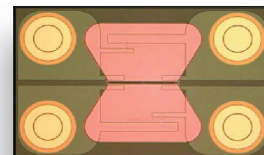
GF705

MagnetoResistive Magnetic Field Sensor

The GF705 is a magnetic field sensor based on the multilayer Giant MagnetoResistive (GMR) effect. The Sensor contains a Wheatstone bridge with on-chip flux concentrators to improve the sensitivity. The sensor is ideal for measuring magnetic fields in a linear range from 1.8 mT up to 8 mT.

A typical application is endpoint detection through a cylinder of stainless steel: A moving magnet inside a thick-walled cylinder is detected by a GF705 sensor from the outside.

The GF705 is available as bond version (bare die) and as flip-chip or LGA-package or vertical package for SMD assembly.



Product Overview

Article description	Package	Delivery Type
GF705ACA-AB ¹⁾	Bare Die	Waferbox
GF705APA-AB	Flip-Chip	Tape on reel (5000)
GF705AMA-AE	LGA6S	Tape on reel (2000)
GF705AMS-AS	SIL4-D	Tape on reel (tbd.)
GF705 Evalboard	Evalboard	ESD-Box

¹⁾ minimum order quantities apply.

Quick Overview

Symbol	Parameter	min.	typ.	max.	Unit
V _{CC}	Supply voltage	-	5.0	-	V
B _{Lin}	Linear magnetic range	1.8	-	8.0	mT
S	Sensitivity (in linear range)	8	10	13	mV/V/ mT
R _B	Bridge resistance	4.25	5.0	5.75	kΩ

Absolute Maximum Ratings

The ratings do not imply opening conditions; functional operation is not guaranteed. Beyond these values damage may occur.

Symbol	Parameter	min.	max.	Unit
V _{CC}	Supply voltage	-9.0	9.0	V
T _{amb}	Ambient temperature	-40	+125	°C

Features

- Based on the GiantMagnetoResistive (GMR) effect
- Flip-chip assembly
- Wide temperature range from -40°C up to +125°C

Advantages

- Large working distance
- Excellent absolute accuracy
- Large range of magnetic field strength
- Very small size
- Contactless field measurement

Applications

- End-point detection
- Reference monitoring
- Magnetic switches



Magnetic Data

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
B_{LIN}	Linear magnetic flux density range (abs)	See Fig. 1	1.8	-	8.0	mT
B_{sat}	Saturation magnetic flux density ¹⁾	See Fig. 1	-	± 25.0	-	mT

¹⁾ At B_{sat} the sensor delivers the maximal output voltage V_{peak} . By exceeding the value B_{sat} the output signal is not longer unique.

Electrical Data

$T_{amb} = +25^{\circ}\text{C}$, unless otherwise specified

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
V_{CC}	Supply voltage		-	5.0	-	V
S	Sensitivity	$B = (1.8...8) \text{ mT}$	8	10	13	mV/V/ mT
TC_S	Temperature coefficient of Sensitivity ²⁾	$T_{amb} = (-40...+125)^{\circ}\text{C}$	-0.26	-0.22	-0.18	%/K
R_B	Bridge resistance ³⁾		4.25	5.0	5.75	k Ω
TC_{RB}	Temperature coefficient of R_B ⁴⁾	$T_{amb} = (-40...+125)^{\circ}\text{C}$	0.17	0.20	0.23	%/K
V_{peak}	Maximum output voltage ⁵⁾	See Fig. 1	-	110	-	mV/V
V_{out}	Voltage output delta ⁶⁾ $V_{OUT(3 \text{ mT})} - V_{OUT(0 \text{ mT})}$	0 mT @90 deg 3 mT @0 deg	12.3	-	27.4	mV/V

$$^2) \quad TC_S = 100 \cdot \frac{S_{(T_2)} - S_{(T_1)}}{S_{(T_1)} \cdot (T_2 - T_1)} \quad \text{with } T_1 = 25^{\circ}\text{C}; T_2 = 125^{\circ}\text{C}.$$

³⁾ Bridge resistance between pads 1 and 3 and 2 and 4.

$$^4) \quad TC_{RB} = 100 \cdot \frac{R_{B(T_2)} - R_{B(T_1)}}{R_{B(T_1)} \cdot (T_2 - T_1)} \quad \text{with } T_1 = 25^{\circ}\text{C}; T_2 = 125^{\circ}\text{C}.$$

⁵⁾ Maximal output voltage at B_{sat} .

⁶⁾ Parameter checked on 96 samples.

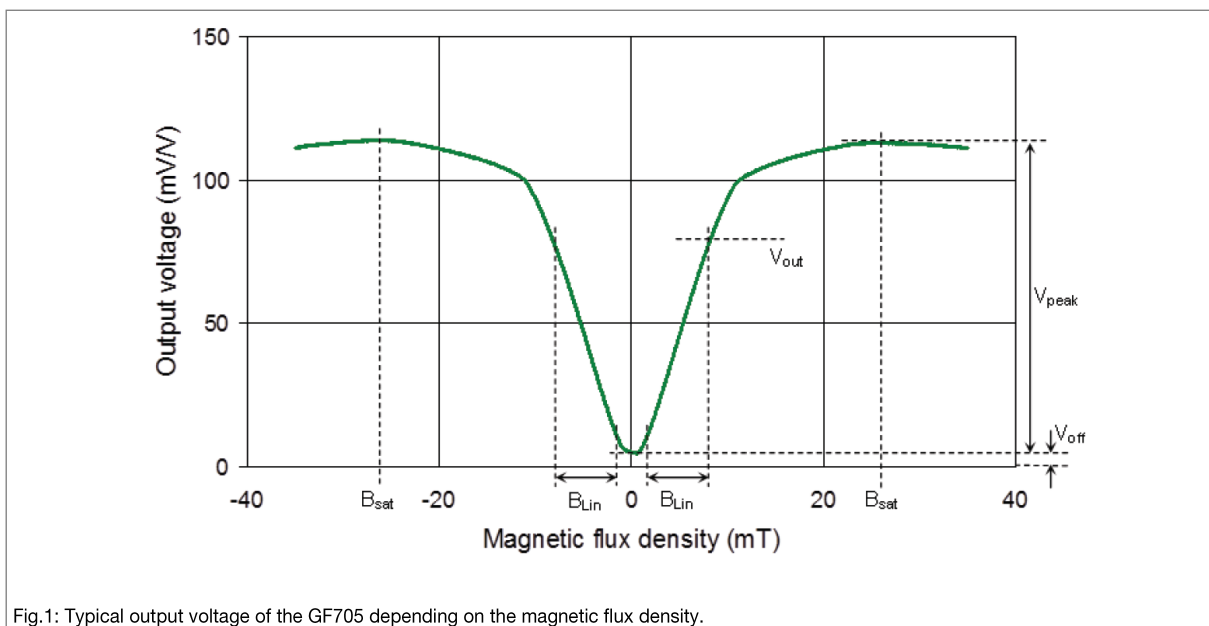


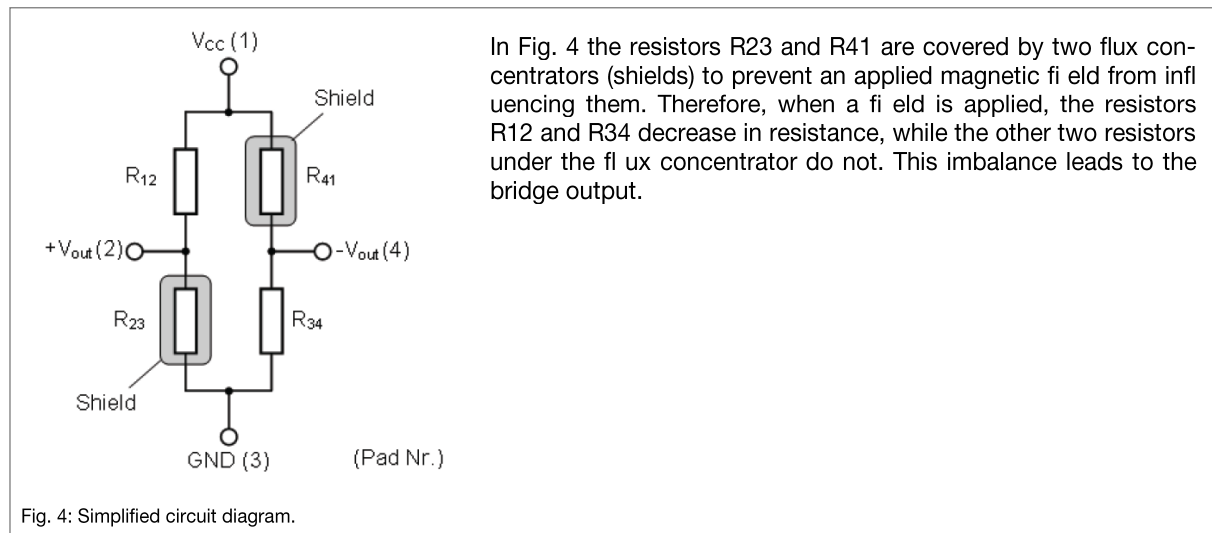
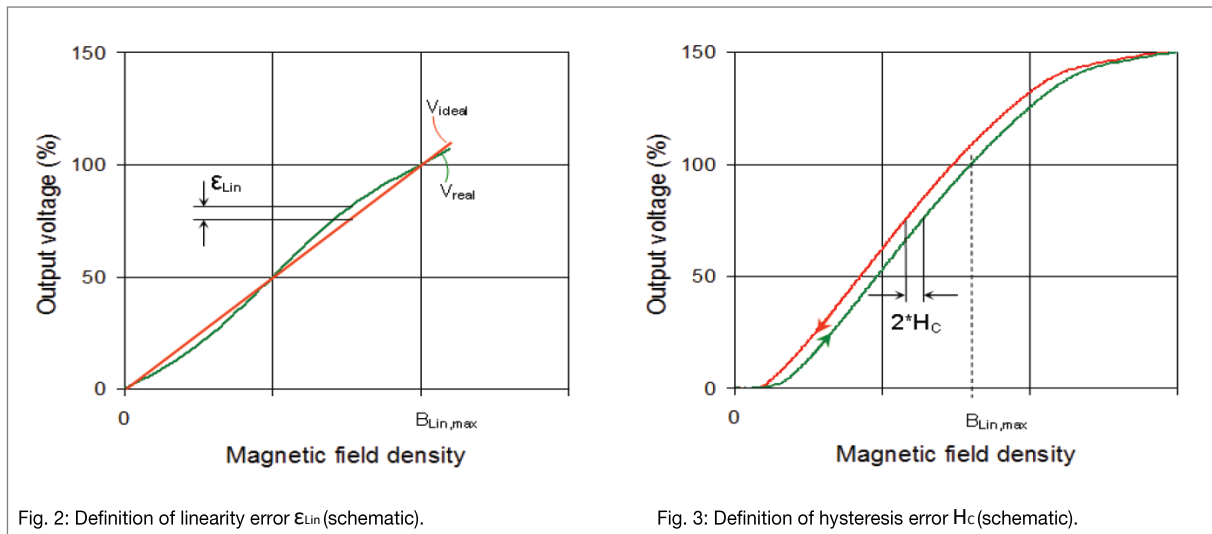
Fig.1: Typical output voltage of the GF705 depending on the magnetic flux density.

Performance Data

$T_{amb} = +25^{\circ}\text{C}$, unless otherwise specified

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
V_{off}	Offset voltage per V_{CC}	See Fig. 1	-5.0	-	+5.0	mV/V
$TC_{V_{off}}$	Temperature coefficient of V_{off}	$T_{amb} = (-40...+125)^{\circ}\text{C}$	-20	7	+25	$\mu\text{V/V/K}$
ϵ_{Lin}	Linearity error	$B = (1.8...8) \text{ mT}$; see Fig. 2	-	2	5	% of V_{out}
H_C	Hysteresis error ¹⁾	See Fig. 3	-	0.05	0.1	mT

¹⁾ The hysteresis error is ascertained in the magnetic field, ramped from 10 mT to -10 mT and back to 10 mT. The value is specified for the linear range B_{Lin} .



Bare die and Flip-Chip

Pinning

Pad	Symbol	Parameter
1	V_{CC}	Supply voltage
2	$+V_{out}$	Positive output voltage
3	GND	Ground
4	$-V_{out}$	Negative output voltage

Note:

Pin 1 is not marked on the chip. Since the chip is symmetrical, its orientation is only defined by its long and short side.

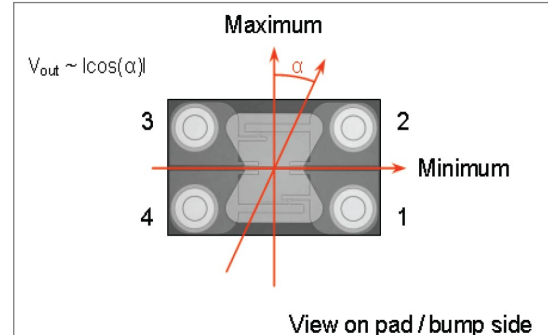


Fig. 5: Top: GF705 on its pad / bump side shown with the direction of its sensitivity. Bottom: Marked side of the flip-chip version only.

Mechanical Data

Symbol	Parameter		min.	typ.	max.	Unit
A	Bare die	Length	1435	1460	1485	μm
B		Width	935	960	985	μm
C		Height	240	250	260	μm
d		Diameter	-	230	-	μm
A	Flip-chip	Length	1425	1460	1485	μm
B		Width	935	960	985	μm
C		Height	400	410	420	μm
d		Diameter ¹⁾	-	300	-	μm
S		Standoff ²⁾	-	240	-	μm
a		Pitch a	-	1000	-	μm
b		Pitch b	-	500	-	μm
e		Pitch c	-	230	-	μm

¹⁾ Diameter of solder balls before reflow

²⁾ After reflow

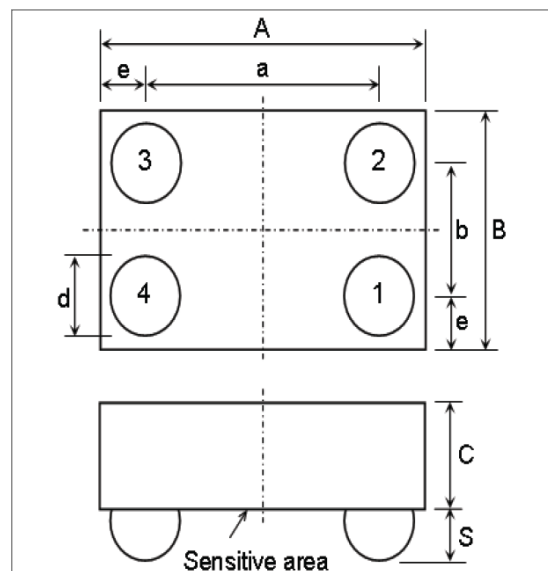


Fig. 6: Chip outline of GF705

Data for Packaging an Interconnection Technologies

Symbol	Parameter	Conditions	Value	Unit
Bare die	Pad material		Au	-
	Pad thickness		0.4	μm
Flip-chip	Solder ball material		SnAg2.6Cu0.6	-
	Maximum solder temperature	For 6 s	260	$^{\circ}\text{C}$

LGA6S

Pinning

Pad	Symbol	Parameter
1	+V _{out}	Positive output voltage
2	NC	Not connected
3	GND	Ground
4	V _{CC}	Supply voltage
5	-V _{out}	Negative output voltage
6-8	NC	Not connected

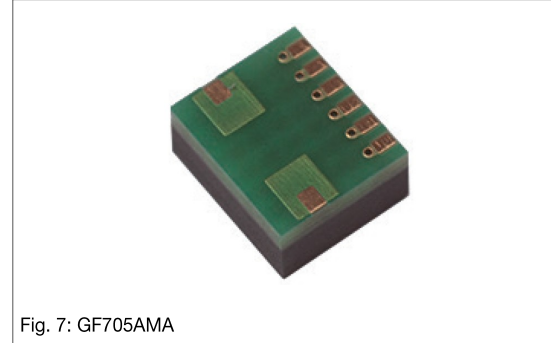


Fig. 7: GF705AMA

Dimensions

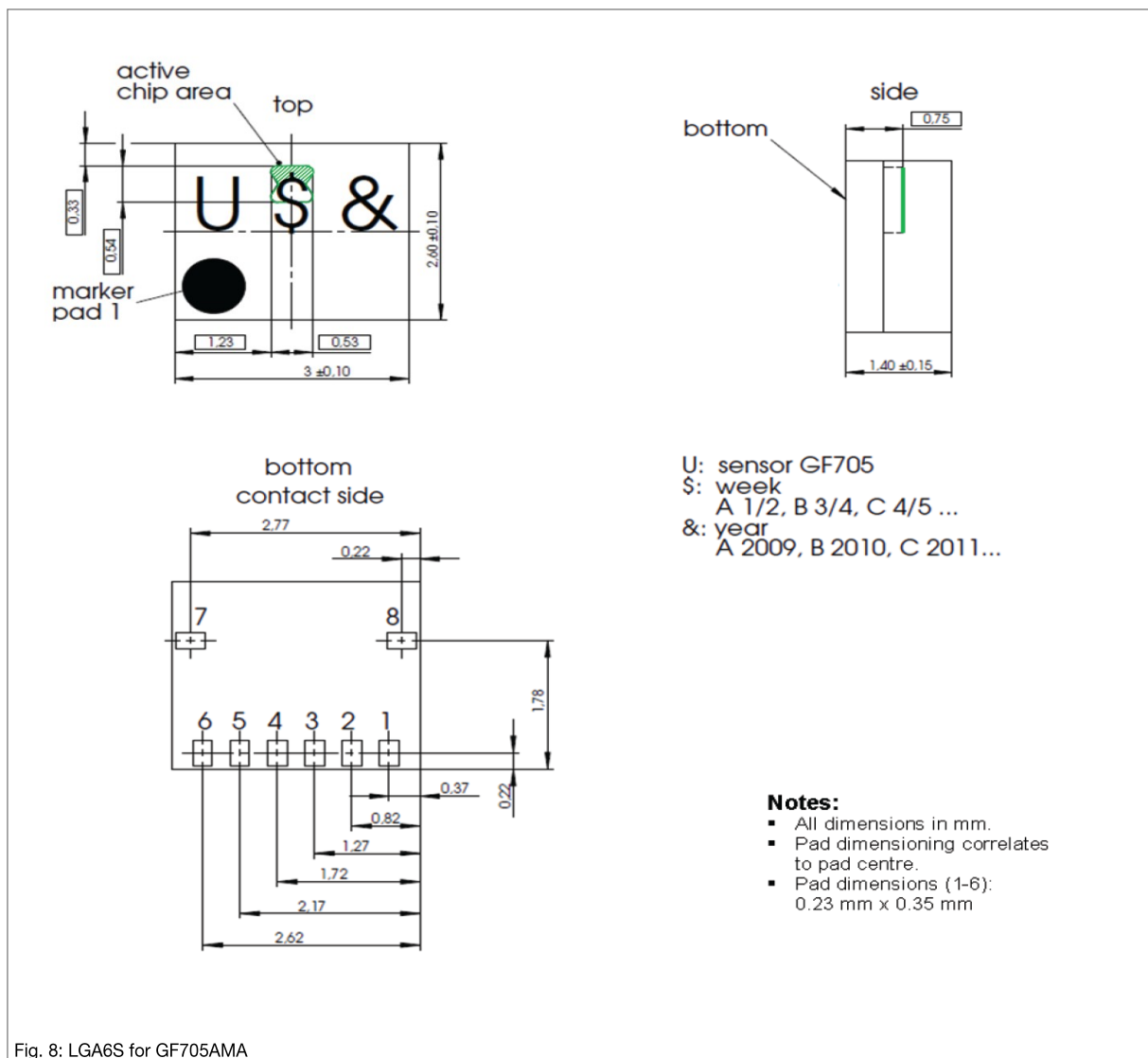
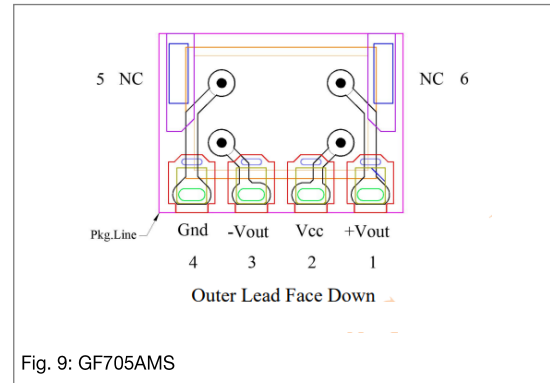


Fig. 8: LGA6S for GF705AMA

SIL4-D

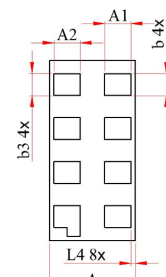
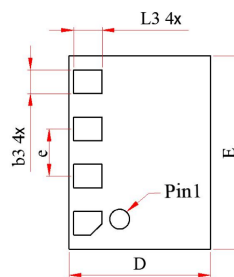
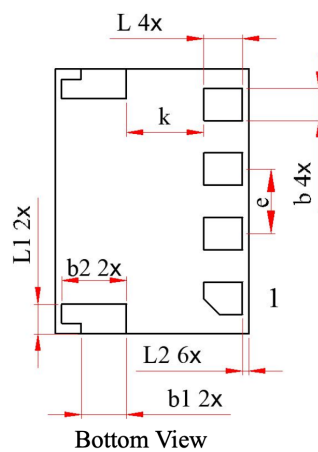
Pinning

Pad	Symbol	Parameter
1	+V _{out}	Positive output voltage
2	V _{CC}	Supply voltage
3	-V _{out}	Negative output voltage
4	GND	Ground
5-6	NC	Not connected



Dimensions

➤ Package Outline Dimensions:



Symbol	Dimension In Millimeters			Dimension In Inches		
	Normal	Min	Max	Normal	Min	Max
A	--	0.950	1.050	--	0.037	0.0411
A1	--	0.220	0.350	--	0.009	0.014
A2	--	0.220	0.350	--	0.009	0.014
D	1.500	1.450	1.550	0.059	0.057	0.061
E	2.050	2.000	2.100	0.081	0.079	0.083
b	0.250	0.200	0.300	0.010	0.008	0.012
b1	0.350	0.300	0.400	0.014	0.012	0.016
b2	0.500	0.450	0.550	0.020	0.018	0.022
b3	0.250	0.200	0.300	0.010	0.008	0.012
L	0.300	0.250	0.350	0.012	0.010	0.014
L1	0.230	0.180	0.280	0.009	0.007	0.011
L2	0.050	0.010	0.090	0.002	0.000	0.004
L3	0.300	0.250	0.350	0.012	0.010	0.014
L4	0.050	0.010	0.090	0.002	0.000	0.004
k	0.600 REF			0.024 REF		
e	0.500 BSC			0.050 BSC		

Fig. 10: SIL4-D for GF705AMS

Evalboard with GF705AMA-AE

Pinout

Pad	Symbol	Parameter
1	+V _{O1}	Positive output voltage bridge 1
2	+V _{O2}	Positive output voltage bridge 2
3	GND	Ground
4	V _{CC}	Supply voltage
5	-V _{O1}	Negative output voltage bridge 1
6	-V _{O2}	Negative output voltage bridge 2

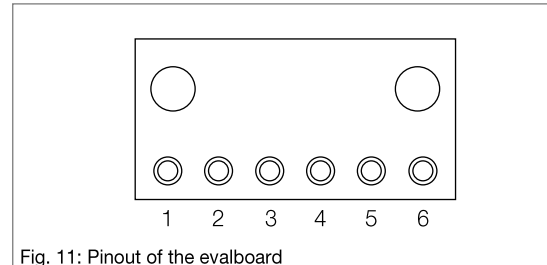


Fig. 11: Pinout of the evalboard

Dimensions

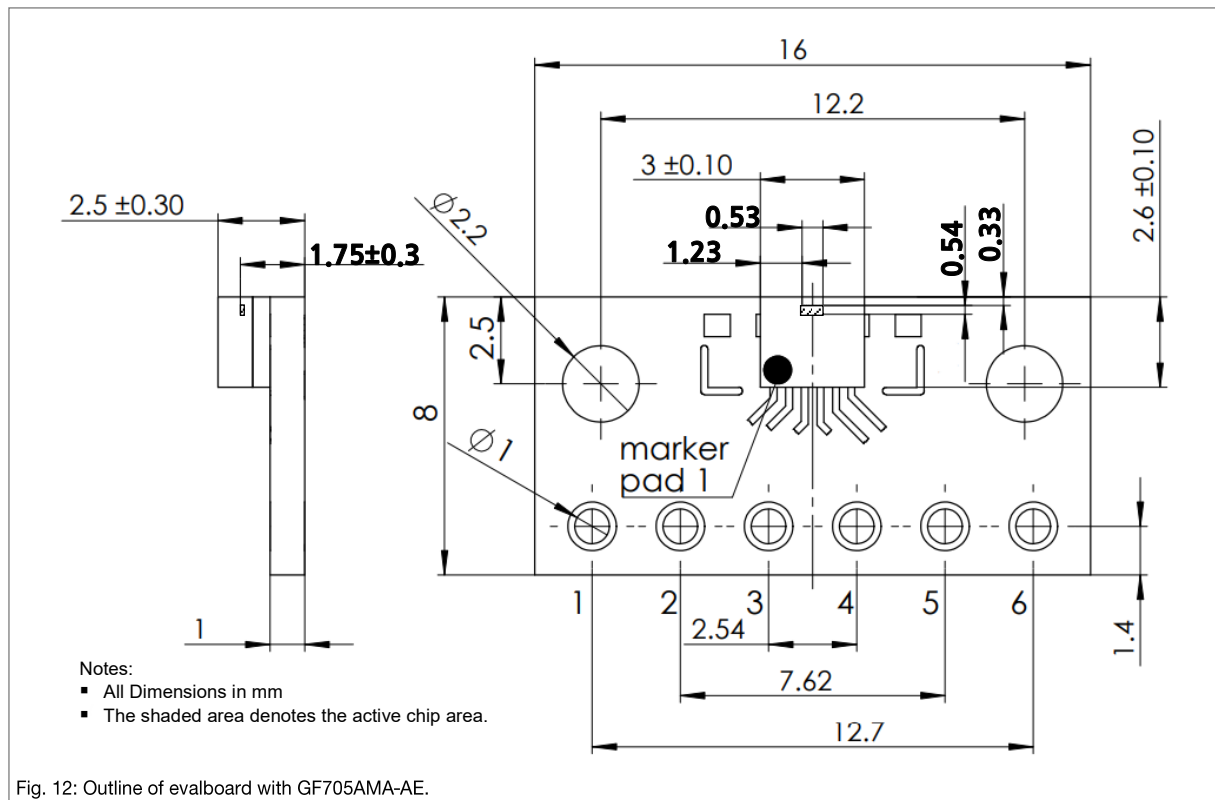


Fig. 12: Outline of evalboard with GF705AMA-AE.

General Information

Product Status

Article	Status
GF705ACA-AB	The product is in series production.
GF705APA-AB	The product is in series production.
GF705AMA-AE	The product is in series production.
GF705AMS-AS	The product is under development. Data sheet is preliminary
GF705 Evalboard	This product is for evaluation of the GF705AMA-AE sensor.
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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Changelist

Version	Description of the Change	Date
GF705.DSE.15	Tighten the bridge resistance tolerance	02/2026
GF705.DSE.14	Add evalboard	10/2025
GF705.DSE.13	Change of article description (p. 1 product overview) Add new product variant (GF705AMS)	05/2023
GF705.DSE.12	Various textual changes	07/2018
GF705.DSE.11	Various textual changes	04/2017
GF705.DSE.10	Change of corporate design (pp. 1-7)	05/2015
GF705.DSE.00	Original (pp. 1-7)	11/2006

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