Mass-Airflow sensor LMM-01

The measurement of flow and flow direction is very important in automotive applications [(1)] for control of the intake air, for climate controls and in medical and industrial applications.
The shown sensor uses basically the principle of an conventional heat film anemometer. By modern thin film technology we have applied very stable thin film resistors on a micromachined membrane. Therefore the response time of the sensor is reduced and a bidirectional flow measurement is possible.

Characteristic

The applied Ni-RTD sensors have a very linear relationship between temperature and resistance. The high temperature coefficient of the Ni-heater 5450 ppm/K offers a high signal level even at low air flows.

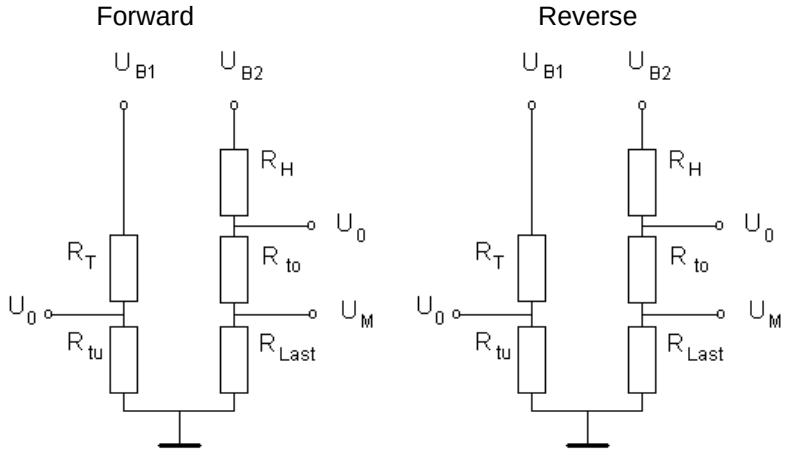
General technical data

Storage temperature:	-40°C .... + 120°C
Operating temperature:	-40°C .... + 120°C
Max. heater over-temperature:	80°C

Electrical data

Resistance of the heaters:	R_H = 45 Ω ± 10% at T = 20°C
Resistance of the temperature sensors:	R_T = 1700 Ω ± 20% at T = 20°C
Temperature coefficient R_H and R_T	TC = 5450 ppm/K ± 5% *)
Matching of temperature coefficients:	TC_{match} < 40 ppm/K *)
	*) between +20°C and +100°C

Circuiting diagram:



The resistors R_H and R_T are located on the thin film element. All further resistors are on the hybrid.

[(1)] The sensor is available for all applications except automotive.

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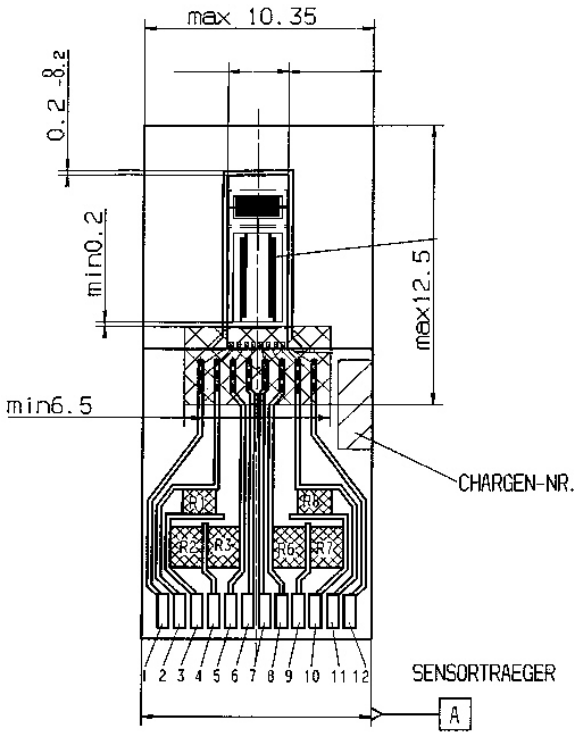
Geometrical Dimensions

Length	23,0 mm ± 0,1 mm
Width	10,1 mm ± 0,2 mm
Thickness (ceramics)	0,63 mm ± 0,05 mm
Bond pads	1,5 mm x 0,5 mm
Max height epoxy sealing	1,8 mm

Drawing



Pinning of the hybrid:

Pin 1+2	R_T			Pin 7+8	R_{HR}		45Ω ± 10%
Pin 2+3	R_{Tu}	(R1)		Pin 8+9	R_{To}	(R6)	
Pin 3	GND			Pin 9+10	R_{Last}	(R7)	10Ω ± 1%
Pin 3+4	R_{Last}	(R2)	10Ω ± 1%	Pin 10	GND		
Pin 4+5	R_{To}	(R3)		Pin 10+11	R_{Tu}	(R8)	
Pin 5+6	R_{HF}		45Ω ± 10%	Pin 11+12	R_{Tr}		

Mechanical requirements

The sensor membrane has a thickness of about 1 µm. Therefore it should not exposed to any mechanical stress. Some has to take care of a filter unit around the measurement device. High speed particles coming direct to the surface of the membrane can result in damages or shortage of the life time.

Environmental testing conditions

Temperature cycles:	100 cycles between –40°C and +120°C
Humidity:	1000 h at 85°C and 85% RH

Further tests like salt spray test and others have been performed.