Flexible thin film pressure sensor
DF9-40 series

Product features

- Ultra-thin, thickness less than 0.3mm
- Quick response
- Long life, passed the pressing test of more than 1 million times
- The detection circuit is simple, easy to integrate and apply
- Sensor profile can be customized
- The sensor range parameters can be customized

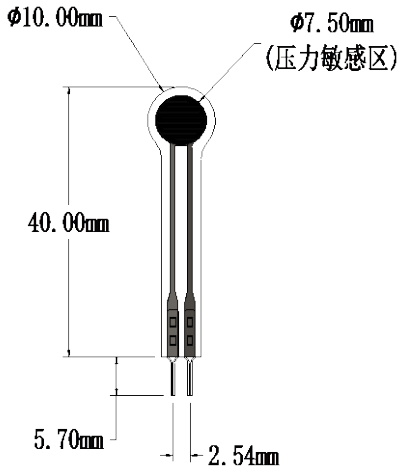
Product description

DF9-40 series flexible thin film pressure sensor is a new type of sensor with independent intellectual property rights of flexible pressure sensor technology. It is printed on flexible thin material with strong adhesion, bending resistance and high sensitivity of flexible Nano functional materials, so as to achieve high sensitivity of pressure detection.

The thin film pressure sensor is a resistive sensor. The output resistance decreases as the pressure on the sensor surface increases. The pressure can be measured through a specific pressure-resistance relationship. It is suitable for pressure measurement scenarios on flexible surfaces, and can be widely used in smart home, consumer electronics, automotive electronics, medical equipment, industrial control, smart robots and other fields.

The DF9-40 series currently has 500g, 2kg, 5kg, 10kg, 20kg and other different range models.

Specification and Dimension



Logo	Size（mm）
Length	45.7
Width	10
Sensitive Zone	φ7.5
Pin pitch	2.54
Tolerance	0.2

DF9--40 series flexible thin film pressure sensor dimensions drawing

✓ **Passed ROHS**

Performance Index

Model	DF9-40@500g	DF9-40@2kg	DF9-40@5kg	DF9-40@10kg	DF9-40@20kg
Range	0~500g	0~2kg	0~5kg	0~10kg	0~20kg
Thickness	≤0.3mm				
Dimension	See specification and size description				
Response point[note1]	≤20g		≤300g		≤700g
Repeatability	±5%(50%Loaded)				
Consistency[note2]	±10%（Batch of the same model）				
Hysteresis	+15% (RF+ - RF-)/RF+				
Durability	＞One million times				
Initial Resistance	＞10MΩ(Non-Loaded)				
Response Time	< 1ms				
Resume Time	< 15ms				
Test Voltage	Typical Value DC 3.3V				
Operating Temperature	-20℃ - 60℃				
EMI	No produce				
ESD	Insensitivity				

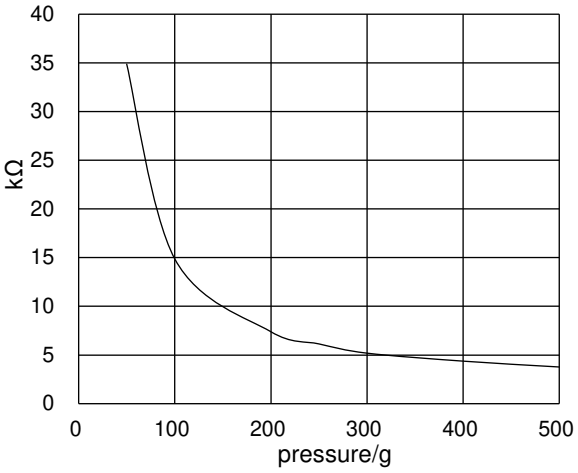
Note 1: The definition of response point: the pressure starts to increase from 0, when the sensor resistance value decreases below 1MΩ, the sensor starts to "respond", and the pressure value at this time is defined as the "response point".

Note 2: The consistency of devices of different batches will be slightly larger; after calibration by the program algorithm, the consistency error can be achieved within ± 15%.

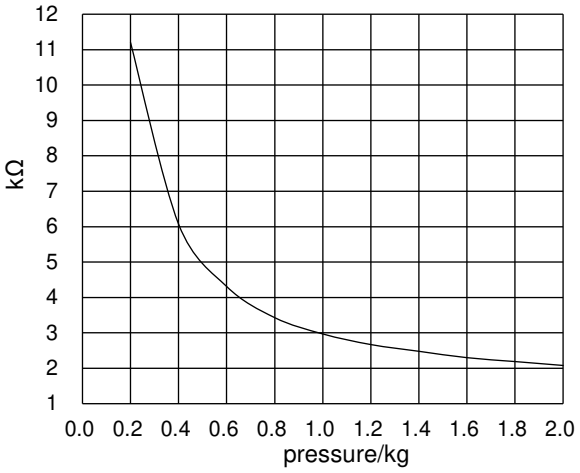
● Force sensitive characteristic

The following is the pressure-resistance curve of each model of the DF9-40 series of flexible thin film pressure sensors. It shows the relationship between the resistance of the sensor output terminal and the pressure of the sensitive zone.

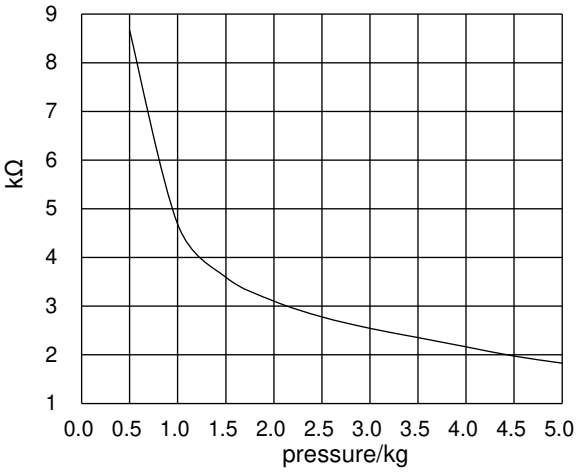
DF9-40@500g Pressure-Resistance Curve



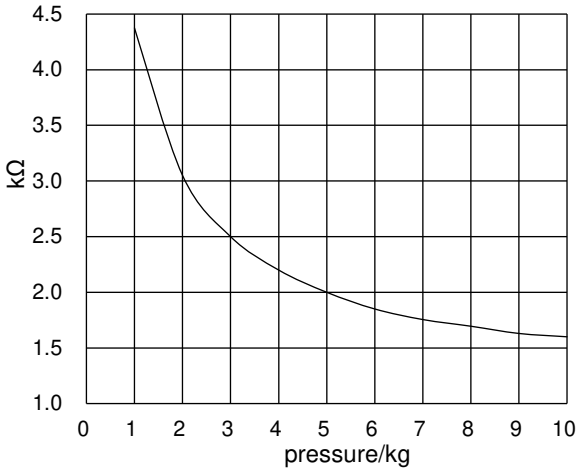
DF9-40@2kg Pressure-Resistance Curve



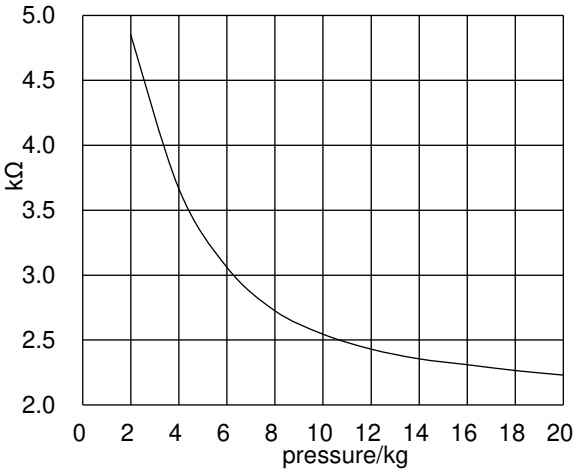
DF9-40@5kg Pressure-Resistance Cruve



DF9-40@10kg Pressure-Resistance Curve



DF9-40@20kg Pressure-Resistance Cruve



Data reference sheet

Model：DF9-40@500g		Model：DF9-40@2kg		Model：DF9-40@5kg		Model：DF9-40@10kg		Model：DF9-40@20kg	
pressure/kg	resistance/kΩ	pressure/kg	resistance/kΩ	pressure/kg	resistance/kΩ	pressure/kg	resistance/kΩ	pressure/kg	resistance/kΩ
0.05	34.87	0.2	11.20	0.5	8.66	1	4.38	2	4.85

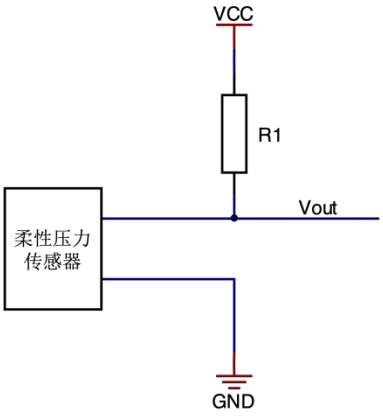
0.1	14.87	0.4	6.07	1	4.68	2	3.05	4	3.67
0.2	7.39	0.6	4.31	1.5	3.60	3	2.50	6	3.06
0.25	6.14	0.8	3.43	2	3.11	4	2.20	8	2.73
0.3	5.19	1	2.97	2.5	2.78	5	2.00	10	2.55
0.4	4.37	1.2	2.67	3	2.55	6	1.85	12	2.43
0.5	3.77	1.4	2.48	3.5	2.36	7	1.76	14	2.36
		1.6	2.30	4	2.17	8	1.70	16	2.31
		1.8	2.19	4.5	1.98	9	1.63	18	2.27
		2	2.08	5	1.83	10	1.60	20	2.23

Note: The curve in the icon is drawn from data measured under specific conditions. The relationship of the curve is for reference only. The actual data should be tested after installation according to the specific application.

Instructions

- DF9-40 series flexible thin film pressure sensor is a non-polar component, there is no directionality in the circuit;
- When using, please place the pressure sensitive zone of the sensor on a firm, flat surface. Using the sensor on a curved or irregular surface will make the sensor initially conductive, that is, in a "response" state when there is no pressure; in this state, the sensor output resistance can still respond to pressure changes, and the corresponding relationship is no longer applicable to the reference data sheet;
- If the supporting surface and the force applying surface are both rigid and hard surfaces, and the contact surface is larger than the sensitive area of the sensor, due to the sensor's own structure, the pressure response may be small and unstable. A round soft rubber pad needs to be affixed to the center of the sensitive area, the diameter is slightly smaller than the sensitive area, and the area should be greater than 60% of the area of the sensitive area;
- You can use double-sided tape to fix the sensor on the supporting surface. Pay attention that the supporting surface is tidy and clean before pasting. It is recommended to use 3M brand double-sided tape; provide customized services;
- After the sensor is stressed and maintains the pressure, the output resistance value will drift slightly over time, usually within 5%. This error can be reduced by the method of timing calibration. In the calibration operation, the waiting time after applying pressure is consistent with the waiting time in actual applications. Since the force state of the sensor is different in different application scenarios, it is recommended that the user arrange the sensor according to the actual application scenario and test the drift parameters by themselves.

Reference Circuit



Partial pressure measurement is adopted.

The pressure sensor is connected in series with R1, and the two ends are respectively connected to VCC and GND to form a basic voltage divider circuit, and the divided voltage is connected to Vout.

The sensor output resistance change corresponding to the pressure change can be converted into a voltage change signal.

Choose the appropriate load resistance R1 according to different application requirements, usually 1kΩ~100kΩ (it is recommended that the load resistance

is 50% of the range pressure corresponding to the sensor resistance value); Vout is connected with single chip micyoco ADC interface, which can be used to detect pressure; MCU external interrupt IO interface, can be used as pressure trigger function.

- .Announcements

- When using the sensor, try to make the load received evenly and avoid direct contact with the sensor by sharp objects;
- Over-range use will reduce the performance of the sensor or even destroy the sensor;
- The sensor terminal is made of copper and tin-plated material, and the lead can be welded according to the needs. It should be noted that the soldering temperature should not be too high, it is recommended that it should not exceed 300° C, and the contact time should not exceed 1 second, so as to prevent the high temperature from melting and deforming the film substrate.