FK9900M:
AgPd resistor paste system for AlN

Fraunhofer IKTS

The AgPd-based resistor paste systems FK9900M-100 and FK9900M-200, with a temperature coefficient of resistance lower than 100 ppm/K, or lower than 200 ppm/K, respectively, are compatible with the conductor pastes FK1205, FK1916 and FK1953, as well as the encapsulation paste FK4027.

Other pastes can be used as conductor paste, but this may result in differing sheet resistance values or temperature coefficients. The pastes listed below may be mixed with each other. It is possible to combine these pastes with those of the FK9600 series without an additional contact layer. To do this, it is required to fire the paste layer before printing the next one. We do not recommend mixing the FK9900M with pastes of the RuO_2-based FK9600 paste series.

Processing

Substrates
The paste is designed for use on AlN substrates (with lapped surfaces) from CoorsTek/ANCeram. Substrates with other surface qualities or from other manufacturers may lead to variations in the results.

Screen printing
Use a stainless steel screen with 280 mesh and a wire diameter of 32 µm, as well as 25 µm emulsion thickness (10 to 12 µm EOM) to achieve the stated film thickness.

Levelling
The screen printed film should level for 10±2 minutes at room temperature (22 to 25 °C).

Drying
The printed films should be dried for 15 minutes at 150 °C in a drying oven with an exhaust air system or in a continuous flow dryer.

Firing
The films should be fired in air at a peak temperature of 850 °C, a dwell time of 10 minutes and a total cycle time of 30 minutes in a belt furnace.

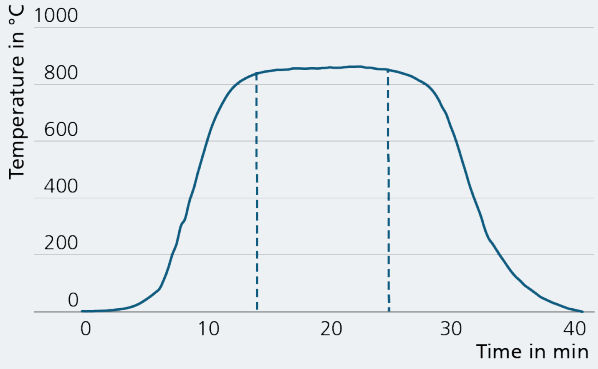
Storage
The paste should be stored at 4 to 10 °C. This guarantees a high paste viscosity and prevents the solids from settling. The jar must remain tightly closed during storage. To prevent condensation of air humidity on the paste, the jar must not be opened until the contents have reached room temperature. Before using the paste, it must be sufficiently homogenized, for example by stirring it with a spatula.

Safety notice
For safe handling of the pastes, please observe the notices in the safety data sheet accompanying each delivery.

Quality requirements
Each delivery will be supplied with Certificate of Analysis (CoA). The paste meets all requirements of RoHS III (regulation 2015/863/EC) and REACH (regulation (EC) 1907/2006).

Instead of an expiration date, after which an expired paste would have to be disposed of regardless of its condition, it is provided with a retest date. The certified values of the paste are valid for six months from the date of shipment of the unopened jars. Prolonged storage may result in segregation of the solids. Then the paste should be mixed thoroughly before further use. After the retest date the customer can decide whether the product needs to be retested to recheck the parameters for further application. The test conditions are given in point 2 to compare the results with CoA.

Firing profile



Firing profile: 30'cycle time, peak 850 °C, dwell time 10 min

For more information please turn the page.

Technical specifications

Parameter	Unit	FK9921M-100	FK9931M-100	FK9941M-100
Viscosity[1]	Pa·s	TBD	TBD	TBD
Sheet resistance[2, 3]	mOhm/sq	100	1.000	10.000
Shipping specifications	%	±20	±20	±20
Hot TCR[2, 4]	ppm/K	0±100	0±100	0±100
Cold TCR[, 4]	ppm/K	0±100	0±100	0±100
Dried film thickness	µm	21±2	21±2	21±2
Coverage[5]	cm²/g	80±5	95±5	100±5

[1] Brookfield viscometer HB with spindle/cup combination SC4-14/-6RP(Y) at n=10 rpm and 25±0.2 °C.
[2] Firing profile: total cycle time 30 min, 10 min at 850 °C.
[3] Calculated for resistors with the geometry 100x0.5 mm2 and a dried thickness of 21±2 µm.
[4] Hot temperature coefficient of resistance (TCR) between 25 °C and 150 °C, cold TCR between -55 °C and 25 °C.
[5] Calculated area that can be printed with one gram paste in the recommended thickness.

Parameter	Unit	FK9921M-200	FK9931M-200	FK9941M-200
Viscosity[1]	Pa·s	TBD	TBD	TBD
Sheet resistance[2, 3]	mOhm/sq	100	1.000	10.000
Shipping specifications	%	±20	±20	±20
Hot TCR[2, 4]	ppm/K	0±200	0±200	0±200
Cold TCR[2, 4]	ppm/K	0±200	0±200	0±200
Dried film thickness	µm	21±2	21±2	21±2
Coverage[5]	cm²/g	80±5	95±5	100±5

[1] Brookfield viscometer HB with spindle/cup combination SC4-14/-6RP(Y) at n=10 rpm and 25±0.2 °C.
[2] Firing profile: total cycle time 30 min, 10 min at 850 °C.
[3] Calculated for resistors with the geometry 100x0.5 mm2 and a dried thickness of 21±2 µm.
[4] Hot temperature coefficient of resistance (TCR) between 25 °C and 150 °C, cold TCR between -55 °C and 25 °C.
[5] Calculated area that can be printed with one gram paste in the recommended thickness.

Miscellaneous

The current technical specifications are published on our website www.ikts.fraunhofer.de.

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