DuPont Electronic Materials

5415A Glass Encapsulant

Thick Film Composition

Product Description

Low temperature glass encapsulant 5415A is intended to form an insulating and protective layer over thick film circuits and is especially suitable for chip resistor applications. It is applied to ceramic substrates by screen printing and fired in an air (oxidising) atmosphere. 5415A is a low viscosity version of 5415 encapsulant.

Major features:

- ❏ Cadmium free product, green colour
- ❏ Protection against environmental conditions
- ❏ Acid resistant
- ❏ Fireable on a low temperature profile with a peak temperature of 600-620°C
- ❏ First encapsulant suitable for chip resistor applications.
- ❏ Low viscosity for easy printing.

Composition properties

Viscosity

150-210 Pa.s, Brookfield HBT. Utility cup and spindle (SC4-14/6R). 10 rpm, 25°C+/- 0.2°C.

Thinner

5415A is optimised for screen printing and thinning is not normally required. DuPont Electronics Composition Thinner 8218 may be used sparingly for slight adjustments to viscosity or to replace evaporation losses. However, the use of too much thinner or the use of a non-recommended thinner may affect the rheological behaviour of the material and its printing characteristics.

Coverage

145 cm^2/g calculated value based on a 20µm dried film thickness.

Shrinkage

Wet to dry	:	41%
Dry to fired	:	55%

(The uncertainty in measuring the thickness especially of the wet film means that these figures are for guidelines only)

Compatibility

Encapsulant 5415A is compatible with DuPont resistors suitable for chip resistor applications.
Whilst DuPont has tested this composition with specified materials and under the recommended processing conditions, it is impossible or impractical to cover every combination of materials, customer processing conditions and circuit layout.
It is therefore essential that customers thoroughly evaluate this material in their specific situations, in order to completely satisfy themselves as to the overall quality and suitability of the composition for its intended application(s).

Recommended processing procedure

Storage

Containers of 5415A may be stored in a clean, stable environment at room temperature (<25°C), with their lids tightly sealed. Storage in freezers (temperature <0°C) is NOT recommended, as this could cause irreversible changes in the material. Jar rolling is unnecessary and is NOT recommended, as this could change the rheology of the material.
For guidance regarding storage of material in refrigerators (0°C to +6°C), consult DuPont Technical Note EUT 7.2 "Shelf Life Policy".

Shelf life

Encapsulant Composition 5415A has a shelf life of 6 months from date of shipment, for factory-sealed (unopened) containers, stored under room temperature conditions.

Printing

Encapsulant composition 5415A should be thoroughly mixed before use. This is best achieved by slow, gentle hand stirring with a clean, burr-free spatula (flexible plastic or stainless steel) for 1-2 minutes. Care must be taken to avoid air-bubble entrapment.
Printing should be carried out in a clean, well-ventilated area.

Additional information on requirements for printing areas is contained in DuPont Technical Guide, EUT 7.3 “Processing-Screen Printing Rooms”, available on request.

Note: optimum printing characteristics of 5415A are generally achieved in the temperature range 20°C-23°C. It is therefore important that the material, in its container, is at this temperature prior to commencement of printing.

Screen printing with 200-280 mesh stainless steel screens yields a dried print thickness of 20-22µm, which fires to give a minimum fired thickness of 10µm.

Drying

Allow prints to level for 5-10 minutes at room temperature in a clean, draught-free environment, followed by drying for 10-15 minutes at 150°C in a well ventilated oven or conveyor dryer.

Firing

Fire in a well ventilated belt or conveyor furnace in air with a 30 minute cycle, from entry to exit, with ≥25 minutes above 100 ˚C. The peak temperature should lie between 600-620°C held for 5-10 minutes. To avoid entrapment of organics in the fired film, where possible it is advisable to allow adequate time (5-10 minutes) during the heating cycle. The fired film of 5415A should give a semi-gloss surface which is green in colour.

Care must be taken to ensure that any gases/vapours from other chemicals/materials (e.g. halogenated solvents) do not enter the furnace muffle. It is also essential that the air supply to the furnace is clean, dry and free of contaminants.

Air flows and extraction rates should be optimised to ensure that oxidising conditions exist within the muffle and that no furnace exhaust gases enter the room.

Laser Trimming of Encapsulated Resistors

Optimum settings will vary with the laser trimming systems used and production rates desired. Clean, continuous cuts with a minimum heat-affected area adjacent to the cut show the best resistor stability.

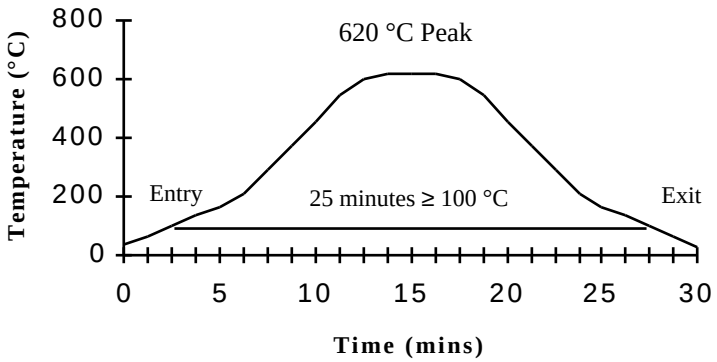
General

Yields and performance will depend to a large degree on the care exercised during processing, particularly in screen printing. Scrupulous care should be taken to keep the encapsulant composition, printing screens and other tools free of metal contamination. Dust, lint and other particulate matter may also contribute to poor yields.

Health/Safety considerations

DuPont microcircuit compositions are intended for use in an industrial environment by trained personnel. All appropriate health/safety regulations regarding storage, handling and processing of such materials should be complied with. For information on health/safety regulations, please refer to the specific MSDS for 5415A and to the DuPont Safety Guide EUT 7.1 “Practical Safe Handling of Thick Film Compositions”.

Typical Firing Profile



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