

33-081
Silver Conductor

Description: For many years, Ferro has been the leading supplier of thick film silver inks designed for making contact to the n-doped silicon front face of photovoltaic devices. Achieving good adhesion with an excellent ohmic contact to this shallow junction is critical in the production of high efficiency cells. Ferro Electronic Materials has produced a number of different formulations for this application. It has been our experience that each cell type has variations in junction depth, dopant concentration and silicon orientation. For this reason, we suggest that a manufacturer new to our product test variations of these formulations, in order to capture the sometimes subtle advantages that one of them may offer for a particular cell type. For similar reasons, our recommended firing profile is meant to be taken as a starting point only and it is absolutely essential that a matrix of profiles be tested to achieve optimum output.

33-081 is a phosphorous doped silver conductor paste for use as a front contact material in mono and polycrystalline solar cells. The material is designed to process over a wide range of firing temperatures with minimal impact on physical and electrical properties.

Thinning: Thinning is not recommended, since the paste is supplied at the correct viscosity for application. Contact your local Ferro Representative for appropriate solvent details, should thinning become necessary to replace solvent lost through evaporation.

Paste Storage & Shelf Life: The paste should be stored in tightly capped containers, in a cool, dry place away from direct sunlight. Properly stored material will have a shelf life in excess of 6 months.

Typical Properties	
Solids:	77.4-79.7%
Viscosity:	900-1,100 poise @ 9.6s ⁻¹
Fineness of Grind:	14-11µm
Print Thickness	
Dry:	16-25µm
Fired:	8-14µm
Standard Test Print Conditions:	325#, screen, 25µm emulsion, 0.5-1.5µm snap off
Standard Test Drying Conditions:	150°C
Standard Test Firing Conditions:	600°C/9-11 minutes peak
Visual Appearance:	Grey, 100% density
Resistivity (normalized to 25µm):	<4mΩ/sq
Solderability:	90% coverage, 3 second dip RMA flux Sn 62 @ 215±5°C
Recommended Thinner:	0800

*Note: This profile is used for product characterization only, in production, infrared firing profiles with spiked peak temperatures in the range of 720-850°C are commonly used. Exact process conditions will depend on many factors and will need to be optimized by each individual user.