

Electrically conductive inks with nanosize silver for Ink-jet printing technology.

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The ink-jet is non-contact techniques for production very complicate electronic patterns like conducting points, lines and even 3D structures for electronic applications. There are two important components of the ink-jet printing technology: one is the printing system - the printer, and the other is the conductive material - the ink. The greatest challenge is the ink formulation, because these inks have to meet strict physicochemical properties: viscosity, surface tension, adhesion to a substrate, etc. This type of fluids must be stable for a long time to avoid sedimentation during printing process and to achieve optimal performance and reliability of the printing system and obtain the best printed pattern.

Amepox Microelectronics in recent years developed two EC inks with nAg for Ink-jet printing technology. Low temperature nanosilver ink (AX JP-60n) with particle sizes 50-60nm - sintering temperature 150°C and high temperature nanosilver ink (AX JP-6n) with particle size 3-8nm – sintering temperature 230°C. The base properties of the inks are shown in Table 1.

	Low temperature nanosilver ink AX JP-60n	High temperature nanosilver ink AX JP-6n
Viscosity	5 – 12 mPas	7,5 – 10,5 mPas
Sizes of silver particles	50 - 60 nm	3 -8 nm
Percentage of silver filler	20 - 30%	40 - 60%
Surface tension value	~ 35 mN/m	28,5 – 32,5 mN/m
Specific gravity	0,8 – 1,0 g/cm ³	1,1 – 1,3 g/cm ³
Sintering temperature	up to 150°C	230°C
Electrical resistivity	5 x 10 ⁻⁶ Ωcm	(4 – 6) x 10 ⁻⁶ Ωcm
Printing possibility	Low temperature substrates	High temperature substrates

Table 1. Technical properties of the inks