

# TechniPad IS 7070

Nitrate Free Immersion Silver



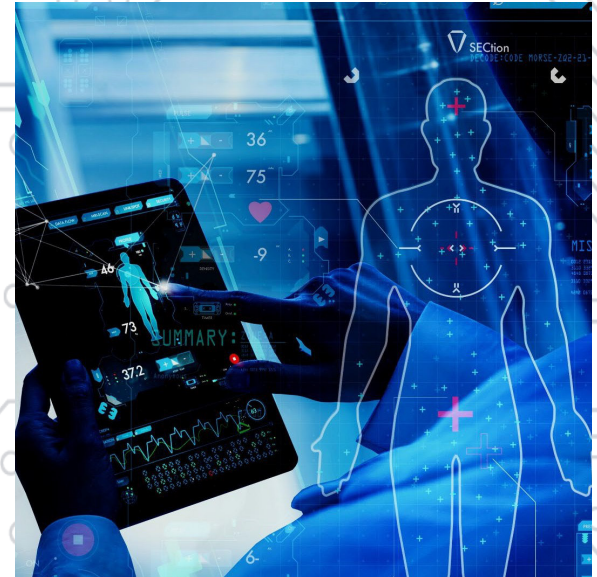
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## Robust Immersion Silver for 5G Applications

Immersion silver is an excellent choice for 5G due to its low impact on insertion or signal loss. The challenge is 5G's mobility requires a finish with superior electrical properties and stability in a variety of environments. TechniPad IS 7070 overcomes this challenge through its unique immersion silver formulation and its use of an organic post-dip.

TechniPad IS 7070 is a nitrate-free immersion silver that operates at a slightly alkaline pH. This produces a pore-free deposit without the aggressive copper attack typical of nitrate based formulations. When used with Tarniban KSII, the pure silver surface is protected with a thin organic coating that does not inhibit soldering or electrical test. The end result is a robust immersion silver deposit for high reliability and high-speed applications.

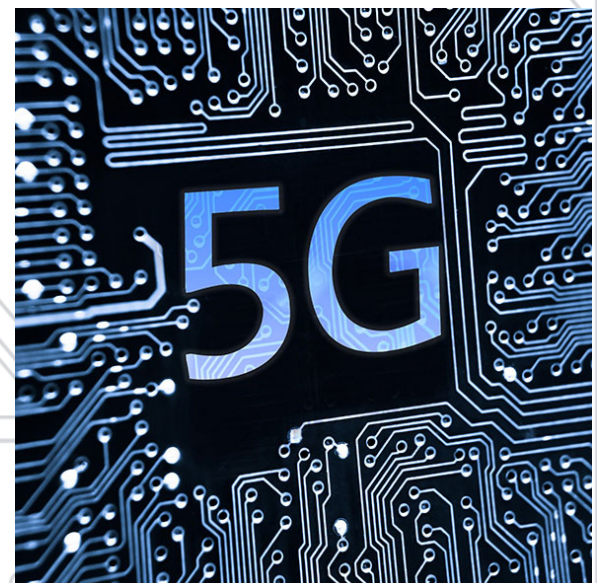


### Features

- Excellent conductivity and low insertion loss
- Nitrate free formula
- Slightly alkaline pH
- Minimal attack on underlying copper surfaces
- Nickel-free
- Thin organic post-dip
- Simple process control with no gold or palladium

### Benefits

- 5G and mm wavelength compatible
- Elimination of main factors that lead to creep corrosion and champagne voids
- Superior copper grain structure of signal traces
- Low cost with no expensive gold or palladium
- Ni-free robust deposit



# TechniPad IS 7070

## Nitrate Free Immersion Silver

Metallic silver has excellent conductivity, which yields electrical performance similar to copper. In 5G applications, electrical performance for a final finish is measured in insertion loss. Even with speeds up to 100 GHz, silver performance is superior to most other metals.

Historically, for PWB applications, silver is deposited using nitrate-based chemistry at an acidic pH. This makes the immersion silver very aggressive to underlying copper, creating thicker deposits. The aggressive nature of these formulas makes them more prone to exposed copper, leading to field issues like creep corrosion and champagne voids.

TechniPad IS 7070 eliminates these issues, because of improved control of silver deposition by replacing silver nitrate with a proprietary, complexed silver. The improved control creates a self-limiting, pore-free silver deposit. This results in a thinner deposit, less attack on the copper trace, improved protection of the copper trace, and better signal integrity.

A series of aging tests were run comparing TechniPad IS 7070 to the nitrate-based chemistries with & without a post Dip (PD). The as-plated condition of the two silver deposits was compared for a typical soldering and tape test. Both types of silver produced good results.

TechniPad IS 7070 outperforms nitrate-based deposits when processed through multiple OSP passes and when subjected to a high sulfur environment designed to develop creep corrosion. Although TechniPad IS 7070 deposits are 1/2 the thickness of other immersion silver deposits, it is more robust and eliminates the major cause for creep corrosion and solder voiding seen with nitrate-based formulas.

Both testing and production experience with TechniPad IS 7070 demonstrate a robust coating engineered to provide a final finish for mm wave and 5G applications.

### Insertion loss copper vs Silver

	Bulk Resistivity ( $\Omega \times 10^{-8} \text{m}$ )	30 GHz		100 GHz	
		Skin Depth ( $\mu\text{m}$ )	Insertion loss* (dB/inch)	Skin Depth ( $\mu\text{m}$ )	Insertion loss* (dB/inch)
Copper	1.69	0.376	-0.45	0.207	-1.25
Silver	1.63	0.366	-0.43	0.203	-1.21



### Overall Comparison IS 7070 Nitrate free vs. Nitrate based

	Tpad IS 7070 w PD	Tpad IS 7070 no PD	Nitric Based w PD	Nitric Based no PD
Soldering & Cosmetics	99.5%	99.5%	100.0%	99.5%
Adhesion	100.0%	97.5%	100.0%	99.5%
OSP Cycles	100.0%	95.0%	35.0%	25.0%
Nitric Porosity	100.0%	100.0%	100.0%	100.0%
Creep	86.0%	74.0%	65.0%	63.0%
Average	97.1%	93.2%	80.0%	77.4%
Overall Ranking	1	2	3	4

