

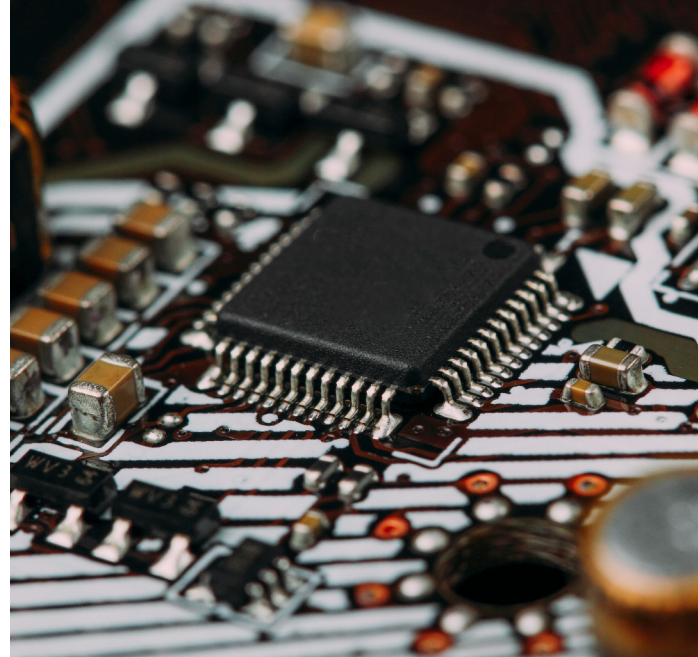
AlphaSTAR®

Immersion Silver for Lead-free Soldering

Microvoid-Resistant Immersion Silver for Lead-free Assembly Processing

AlphaSTAR® is an industry-leading tarnish-resistant immersion silver process that eliminates planar microvoids while preventing creep and flaking corrosion. The process meets the most complex lead-free assembly, end use performance and application requirements as mandated by the world's leading OEMs, PCB assemblers and fabricators.

AlphaSTAR selectively deposits a consistent and reliable high performance silver coating that delivers exceptional first-pass yields at the lowest cost of ownership versus traditional metallic processes. The AlphaSTAR process does not require an anti-tarnish, allowing for a reduced equipment footprint and rework costs.



KEY FEATURES

- Inherently microvoid resistant, easily passing acceptance criteria for planar microvoids as established by OEMs
- Typical bath achieves 50% more MTOs than comparable processes
- No solderability defects during assembly
- Superior tarnish resistance with wide operating window
- Prevents galvanic etch formation



MacDermid Enthone

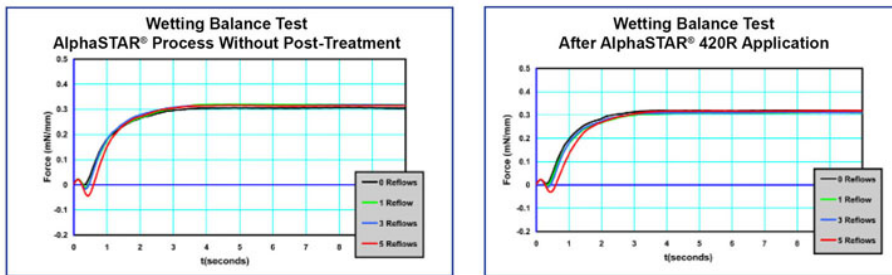
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Excellent Performance with a Simple Process Flow while Meeting All Key Reliability Test Requirements

The AlphaSTAR process provides superior long term electrical properties as demonstrated by the surface insulation resistance (SIR) and electromigration (EM) test results provided in the chart below. In addition, AlphaSTAR immersion silver provides a clean surface that easily passes the IPC ionics test and typical automotive requirements. The consistent, reproducible coating possesses superior tarnish resistance, low contact resistance and is extremely easy to use. AlphaSTAR products are RoHS and WEEE compliant, thus enabling OEM lead-free conversions.

Wetting Performance



Wetting balance test results demonstrate exceptional solderability, even after six lead-free reflows at 262°C using industry-leading no-clean, lead-free solder pastes and fluxes.

Reliability Test Results

Test	AlphaSTAR	Results	Requirements Reference
SIR 85°C/85%RH IPC-TM-650 2.6.3.5	2.46E+9 24 hours 3.15E+9 96 hours	Pass Pass	>1E+8; IPC-4553
SIR 35°C/85%RH 100VDC IPC-TM-650 2.6.3.5	3.56E+11 24 hours 4.62E+11 96 hours	Pass Pass	>1E+10; IPC-4553 and GR-78 (Bell-core)
EM 10V bias, 100V test, 85°C/85%RH IPC-TM-650 2.6.14.1	2.46E+9 24 hours initial 1.18E+10 504 hours (21 days) No dendrites	Pass Pass	<1 decade drop in resistance. No evidence of dendrites. IPC-4554 and J-STD-004
Ionic (static method) IPC-TM-650 2.3.25.1	Typically 0.07-0.48 µgrams/cm ² of equivalent NaCl	Pass	<1.56 µgrams/cm ² of equivalent NaCl IPC4553 and J-STD-001 section 8.3.6

Process Flow

