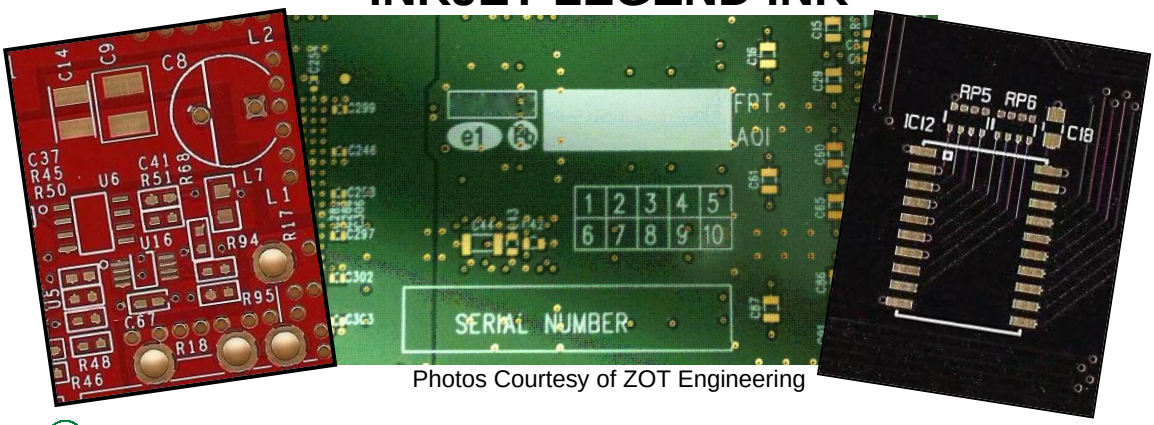
TAIYO IJR-4000 MW300

INKJET LEGEND INK



Photos Courtesy of ZOT Engineering

- **Inkjet Application; Fast UV Curing**
- **High Cured Hardness**
- **Halogen-free; Bright White Color**
- **Excellent Adhesion to Semi- and Fully-Cured Solder Mask Surfaces**
- **RoHS & REACH Compliant**
- **High Opacity and Non-Yellowing**
- **Compatible with Lead-Free Processing**
- **Compliant to Outgassing**
- **Compatible with Piezo drop-on-demand (DOD) print heads used by Orbotech, Microcraft and FirstEIE.**

PROCESSING PARAMETERS FOR IJR-4000 MW300

IJR-4000 MW300 is a single component UV curable Inkjet Marking ink for Printed Circuit Boards. It is applied with a Piezo drop-on-demand (DOD) print head. **IJR-4000 MW300** is fast curing and can be applied to both Semi and Fully cured solder mask.

Environmental: All Taiyo America products comply with Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the Restriction of the use of certain Hazardous Substances (RoHS) in electrical and electronic equipment. **IJR-4000 MW300** contains no Substances of Very High Concern (SVHC) according to the latest list of substances from the European Chemicals Agency (ECHA) as of October 2010. See the Taiyo America website (www.taiyo-america.com) for more specific documentation. This is a "halogen-free" material.

Industry and Military Specifications: **IJR-4000 MW300** passes the requirements of IPC-4781 for rigid boards. It meets the performance criteria for CID A-A-56032D type II as they apply to printed circuit boards and meets the requirements of MIL-PRF-31032, MIL-PRF-55110, MIL-P-50884 MIL-I-43553 and NASA Outgassing.

IJR-4000 MW300 SPECIFICATIONS:

	IJR-4000 MW300
Viscosity:	< 15 cps (cone-plate type, 5 rpm, 45°C)
Color:	White
Specific Gravity:	1.18
Surface Tension:	22-25 mN/m at 20-25°C
Shelf Life:	5 Months provided the customer has, at all times, stored the ink in a dark place at a temperature of 5°C (41°F), and 3 Months when stored at 20°C (68°F)

MIXING/DISPENSING: **IJR-4000 MW300** is supplied in a 1 liter bottle containing 1 kg of ink. The ink should be gently stirred well prior to use to make it homogeneous. Do not shake the container as this will introduce bubbles into the ink and will cause printing defects. No dilution is necessary or recommended.

PRE-CLEANING: Prior to legend ink application, the surface of the panel needs to be free of contaminants. Our recommendation is to apply the legend ink on the circuit board after developing the solder mask. If the legend ink is applied after solder mask final cure, the surface needs to be cleaned chemically to make sure there are no contaminants on the surface. It is not a good idea to mechanically scrub the solder mask prior to applying the legend ink.

PROCESSING PARAMETERS FOR IJR-4000 MW300

INKJET APPLICATION: Method: Inkjet printers

- Surface: Semi-Cured or Fully Cured Solder Mask

NOTE: Adhesion is affected by the degree of cure of the solder mask. Adhesion is best when the ink is applied to semi-cured solder mask (after development,) and co-cured with the solder mask.

Adhesion is also dependent upon the exposure energy and level of solder mask cure. Best adhesion is obtained with lower exposure energy (< 600 mJ/cm^2). Avoid any UV bump cure before ink application.

- Typical coating thickness after curing is 10-15 µm. Thicker coatings may cause reduced adhesion, hardness, and chemical resistance.

FINAL CURE:

- UV Bump after Jetting: 800 – 1000 mJ/cm^2
- Thermal Cure: 150°C for 60 minutes

NOTE 1: When applying this product to semi-cured solder mask (after development, before thermal cure) the UV Bump is optional and may not be needed for good adhesion.

NOTE 2: When applying this product to semi-cured solder mask the legend ink and solder mask should be co-cured at the same time.

For Process Optimization please contact your local Taiyo Representative

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Taiyo warrants its products to be free from defects in materials and workmanship for the specified warranty; **IJR-4000 MW300 Warranty period is 5 Months provided the customer has, at all times, stored the ink in a dark place at a temperature of 20°C (68°F) or less**. TAIYO accepts no responsibility or liability for damages, whether direct, indirect, or consequential, resulting from failure in the performance of its products. If a TAIYO product is found to be defective in material or workmanship, its liability is limited to the purchase price of the product found to be defective. TAIYO MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND MAKES NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR PURPOSE. TAIYO'S obligation under this warranty shall not include any transportation charges or costs of installation or any liability for direct, indirect, or consequential damages or delay. If requested by TAIYO, products for which a warranty claim is made are to be returned transportation prepaid to TAIYO'S factory. Any improper use or any alteration of TAIYO'S product by the customer, as in TAIYO'S judgment affects the product materially and adversely, shall void this limited warranty.

FINAL PROPERTIES FOR IJR-4000 MW300

General Properties

Test	Test Method / Requirement	Results
Pencil Hardness	Internal Test	≥ 5H
Adhesion after Cure – Rigid Boards	Cross Cut 10 X 10 Tape Test	Pass
Solder Heat Resistance	Solder float test; No-clean Flux 260 ± 5°C / 10 sec, 3 cycles	Pass
Appearance/Color	Visual Inspection	Pass
Solvent Resistance	PGM-Ac, 20°C / 30 min, Tape Test	Pass
Acid & Alkaline Resistance	10 vol.% H_2SO_4, 20°C / 30 min 10 wt.% NaOH 20°C / 30 min	Pass Pass
Outgassing	ASTM E595 %TML - %WVR (1.18 –0.89); <1.0% %CVCM (0.08); < 0.10%	 0.29 % 0.02 %

Reliability

Test	Test Method / Requirement	Results
Dielectric Strength	Raise DC 500V/sec; 500V minimum	Pass (1.1 KV)
RoHS Approved	2005/618/EC(IEC62321 Edition 1.0:2008)	Pass
Halogen-Free	JPCA-ES01-2003	Pass – 106 ppm Total

IPC4781 Legend Ink - Requirements per Table 1

Requirement	IPC-4781 Paragraph	Test Method	Requirement	Result
Hardness	3.5.1	ASTM D3363	2H minimum	Pass - >4H
Adhesion*: Rigid Boards, Solder Mask & Base Material	3.5.2.1	IPC-TM-650, 2.4.28.1	n/a	Pass
FTIR	3.2.3.1	n/a	n/a	Spectra on File
Environmental Compliance	3.12	TSCA	Approved	Pass
		RoHS	Compliant	Approved
		REACH	Compliant	Pass
		Halogen Free JPCA-ES01-2003	< 900 ppm Cl < 900 ppm Br	Pass
Resistance to Solvents & Cleaning Agents	3.6.1	IPC-TM-650, 2.3.42	No Degradation	Pass
Hydrolytic Stability	3.6.2	IPC-TM-650, 2.6.11	No Reversion, Etc	Pass
Resistance to Tin-Lead Solder	3.7.2	IPC TM-650, 2.6.8 J-STD-004	No Residue	Pass
Resistance to Lead-Free Solder	3.7.3	IPC TM-650, 2.6.8 J-STD-006	No Residue	Pass
Simulation of Lead-Free Reflow	3.7.3.1	IPC-TM-650, 2.6.8 J-STD-006	No Residue	Pass
M&IR (SIR)	3.9.1	IPC-TM-650, 2.6.3.1	> 500MΩ	Cycling: 4.0 E11 Ω @ 50°C: 1.2 E 12 Ω
Electrochemical Migration	3.9.2	IPC-TM-650, 2.6.14	No migration > 500 MΩ	Pass
Thermal Shock	3.9.3	IPC-TM-650, 2.6.7.3	No Blistering, Crazing or Delamination	Pass
Shelf Life	3.2.5	n/a	n/a	5 months @ 20°C
Cure	3.2.7	n/a	n/a	Pass
Non-Nutrient	3.2.8	IPC-TM-650, 2.6.1	Not support Growth	Pass
Visual Requirements	3.3	Visual Examination	No Discoloration or Degradation	Pass

* - NOTE: Although this product is not specifically recommended for application to flexible circuitry, it has been judged acceptable for some applications. This product must be tested for acceptability before it is to be used on flex circuits.

CID A-A-56032D Performance Requirements

Test	A-A-56032D Paragraph	Requirements	Results
Adhesion	3.7	Cured ink impressions shall not deteriorate when subjected to trichloroethylene vapors at 86.5 to 88C for a period of not less than three minutes and not greater than six minutes.	Passes on FR-4, Copper and Glass
Electrical Resistance (Type II) Before Conditioning After Conditioning	3.8	 1×10^{12} ohms minimum 1×10^{10} ohms minimum	 1×10^{12} ohms (prelim) 3.1×10^{10} ohms
Abrasion Resistance	3.9.1	Cured ink impressions shall retain their legibility after subjection to 300 to 303 revolutions of the CS-10 abrasive wheel while under a minimum load of 2.2 pounds in accordance with ASTM D4060.	Pass
Chemical Resistance	3.9.2	Cured Ink impressions shall retain their legibility when immersed for a minimum of 30 minutes in water, denatured ethyl alcohol, and non-ODC (Ozone Depleting Chemical) cleaning solvent.	Pass
Chemical Resistance (Type II)	3.9.2.1	In addition to 3.9.2, Type II cured ink shall be resistant to hot solder and flux.	Pass
Salt Spray Resistance	3.9.3	Cured Ink impressions shall not deteriorate when exposed to a 5 percent salt spray solution at 33 to 37°C for a period of not less than 48 hours.	Pass
Light Fastness	3.9.4	Cured ink impressions shall not fade and shall remain legible when tested by a light fastness test. To determine conformance, one half of the surface of the test specimens shall be covered to obscure the light, and the remaining half shall be exposed for 24 hours to the light source outlined in ASTM G153 using daylight filter and exposure cycle 7 or ASTM G155 using window glass filter and exposure cycle 4.	Pass
Stability	3.9.5	Cured ink impressions shall not fade, chip, peel, or flow and shall remain legible when exposed to a temperature of 118 to +/- 3°C for a period of not less than 24 hours.	Pass
Fungus Resistance	3.9.6	Cured ink impressions shall not support fungi growth when inspected.	Pass