TAMURA

TAMURA KAKEN (UK) LTD

Product Information

Feb 2003

Carbon Resin Conductive Paste

CARBOLLOID MRX-713J

DESCRIPTION

CARBOLLOID MRX-713J is suitable for use in the production of printed key pads or jumper circuits, giving excellent printing characteristics.

It is a single component system which requires no mixing.

PHYSICAL PROPERTIES

Dry Resistivity	30 Ohms/square at 15 microns thickness
High temperature Resistance (100°C - 500hrs)	0-4%
Humidity Resistance (60°C, 90%RH, 500hrs)	0 - 11% resistivity change
Copper Adhesion	100/100 Cross Cut Tape test
Solder Heat Resistance	100/100 Adhesion on copper 0 - 1% resistivity change
Viscosity	300 dPa.s at 20°C

RECOMMENDED PRINTING PARAMETERS

Screen	150-250 mesh polyester or stainless steel screen (60 – 100T)
Squeegee	65 - 80 Shore Hardness
Screen Cleaner	Toluene, Xylene, T.C.E. etc

CURING

150°C for 15 minutes in an air oven.

SHELF LIFE

I f stored in the right conditions the solder paste should be good for at least 12 months without the need fof
If stored in a fridge, 3 months from date of manufacture.

TECHNICAL INFORMATION

MRX-713J TECHNICAL INFORMATION

1. MRJ-713J SPECIFIC AREA

Table 1 : MRX-713J Specific Data

ITEMS	DATA	TEST CONDITION
Viscosity	300 dPa.s	20°C, Viscotester VT-04
Sheet Resistivity	30 Ohm / أ	
Adhesion on Copper	100/100	Cross Cut Tape Test
<u>Solder Heat Resistances</u> Change of Resistivity Adhesion on Copper	 -1% 100/100	260°C, 10 sec RA Flux
Change of Resistivity after PEELCOAT curing	-2%	150°C, 7 min M-100
Change of Resistivity after PEELCOAT curing and Solder Dipping	-5%	150°C, 7 min M-100 260°C, 10 sec RS Flux
<u>Pressure Cooker Test</u> Solder Dipped - Change of Resistivity - Adhesion on Copper Not solder Dipped - Change of resistivity - Adhesion on Copper	 +6% 100/100 -10% 100/100	Saturated Type 121°C, 8 hrs
<u>Adhesion on Overcoat</u> PHOTOCOAT USR 2G-SH - On Laminate - On Copper PHOTOCOAT USR 11G-11 - On Laminate - On Copper	 100/100 100/100 100/100 100/100	120W/cm, 3 lamps 7 m/min
Powder Dropping	Passed	
<u>Printing Resolution</u> Initial - On Laminate - On Copper After 200 Panels - On Laminate - On Copper	 0.4mm 0.4mm 0.4mm 0.4mm	Pattern width 0.4mm 30°C, 1.0 min left standing before curing

Curing Condition : 165°C 3 min by IR furnace

Table 1 : MRX-713J Specific Data (Cont)

ITEMS	DATA	TEST CONDITION
Abrasion Resistance Change of Insulation Resistivity Powder Dropping	Before / After $10^{13}/10^{13}$Ohm a little	Weight 50g, 10000 times
High Temperature Ageing - Solder Dipped - Not Solder Dipped	 - 6% - 7%	100°C, 500 hrs
High Humidity - Solder Dipped - Not Solder Dipped	 + 13% + 18%	60°C, 90%RH, 500 hrs
Oil Dipping Solder Dipped - Change of Resistivity - Adhesion on Copper Not Solder Dipped - Change of Resistivity - Adhesion on Copper	 - 5% 100/100 + 10% 100/100	260°C, 10 sec, 100 times
Salt Water Spray Solder Dipped - Change of Resistivity - Adhesion on Copper Not Solder Dipped - Change of Resistivity - Adhesion on Copper	 + 1% 100/100 + 3% 100/100	35°C, 5%NaCl, 96 hrs
Boiling Water Test Solder Dipped - Change of Resistivity - Adhesion on Copper Not Solder Dipped - Change of Resistivity - Adhesion on Copper	 + 2% 100/100 - 13% 100/100	100°C, 2 hrs, 4 times
Solder Heat Resistance - Change of Resistivity - Adhesion on Copper	 - 18% slight peeling	300°C, 5 sec, 10 times

Curing Condition : 165°C 3 min by IR furnace

2. MRX-713J ADHESION OF OVERCOAT

Table 2 : MRX-713J Adhesion Test Result

Overcoat Resist	Conveyor Speed	On Laminate	On Copper
USR 2G-SH	3m/min 5m/min 7m/min	good poor good	good poor good
USR-11B-11	3m/min 5m/min 7m/min	acceptable good superior	acceptable good superior

Undercoat : USR 2G-SH in 120W/cm 3 lamps 5m/min

3. MRX-713J INTER-LAYER ADHESION

Table 3 : Adhesion between Carbon & Overcoat

Undercoat Resist \ Overcoat Resist		USR 2G-SH	USR 11B-11
USR 2G-SH	On Laminate	poor	good
	On Copper	poor	good

Curing parameter : 12W/cm 3 lamps 5m/min

4. MRX-713J : FILM THICKNESS EFFECTS

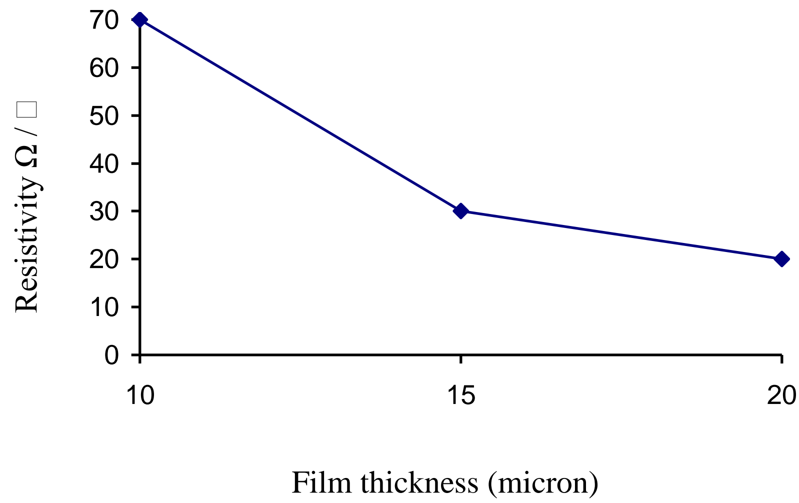

Figure 1: Sheet Resistivity vs. Film Thickness

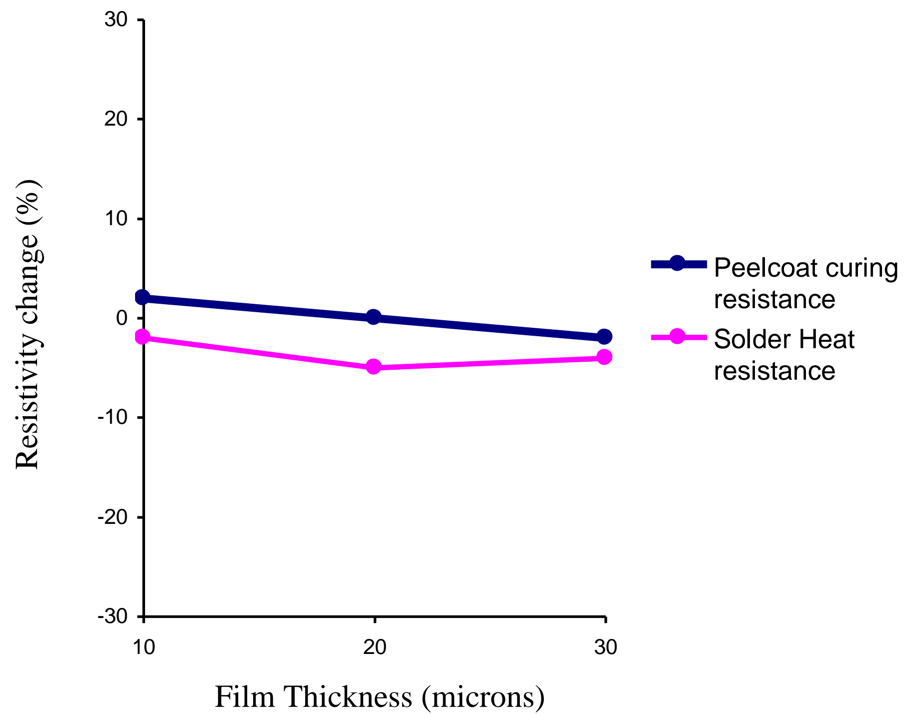

Fig. 2 Film Thickness vs. Solder Heat Resistance & Peelcoat Curing Resistance

5. MRX-713J EFFECTS OF IR FURNACE PASSES

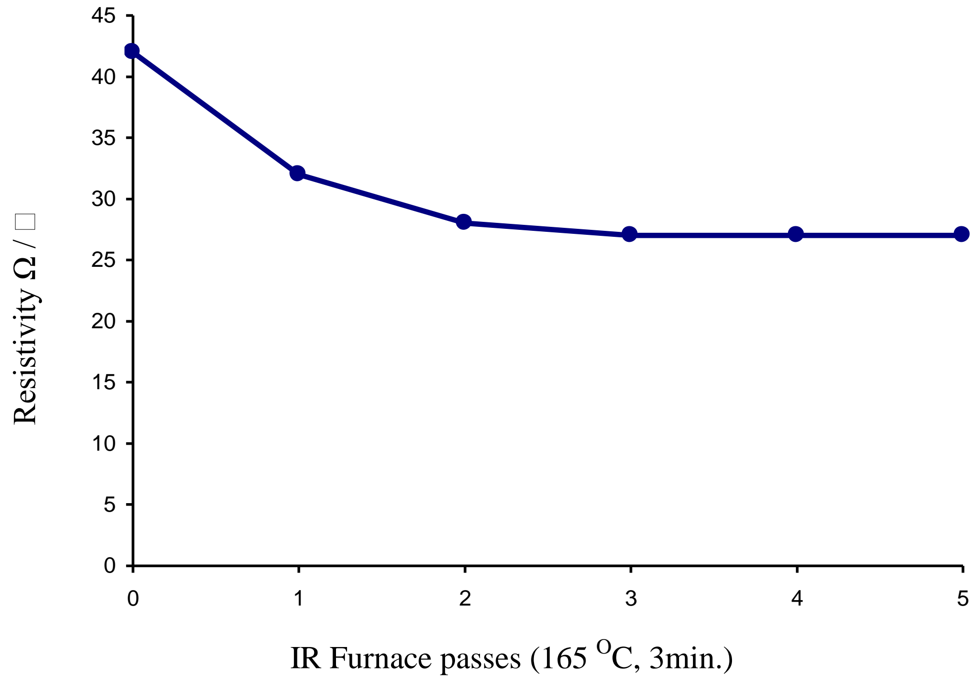

Fig. 3: Sheet Resitivity vs. Furnace Passes

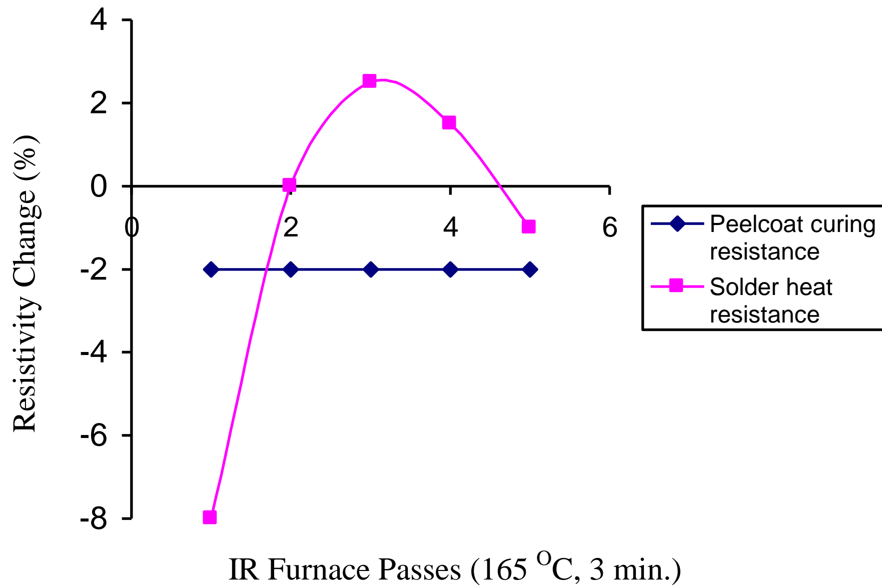

Fig 4 Solder Heat Resistance and Peelcoat Curing Resistance vs. IR Furnace Passes

6. MRX-713J Continuous Printability

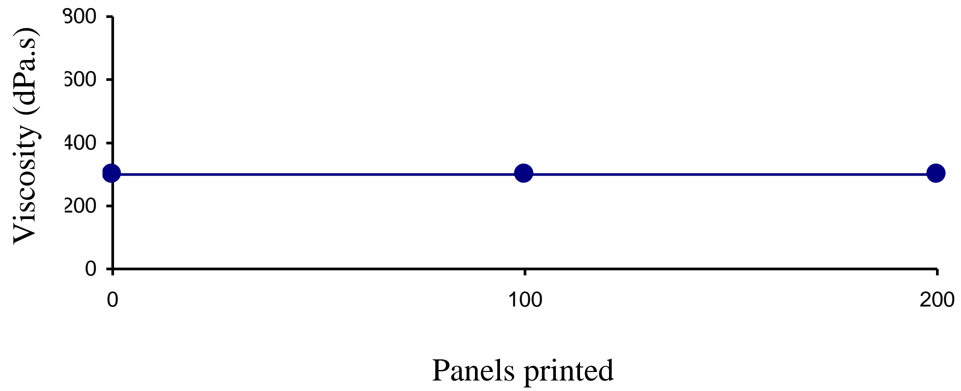

Fig. 5 Change of Viscosity on Screen

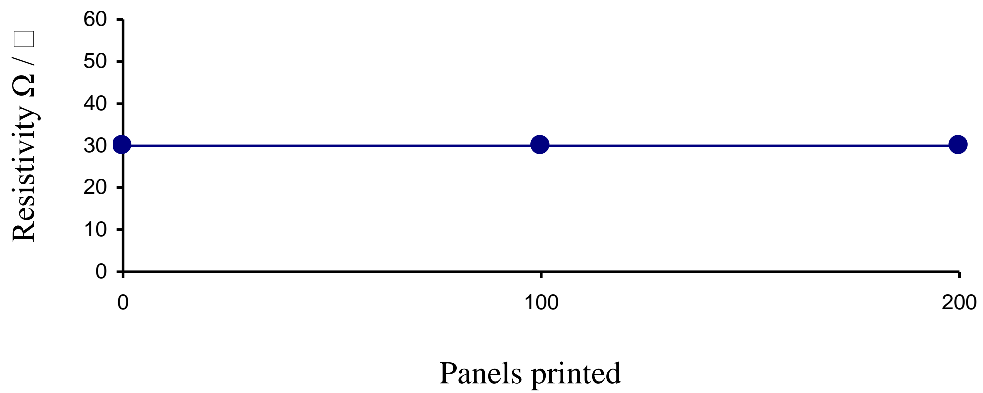

Fig. 6 Change of Sheet Resistivity

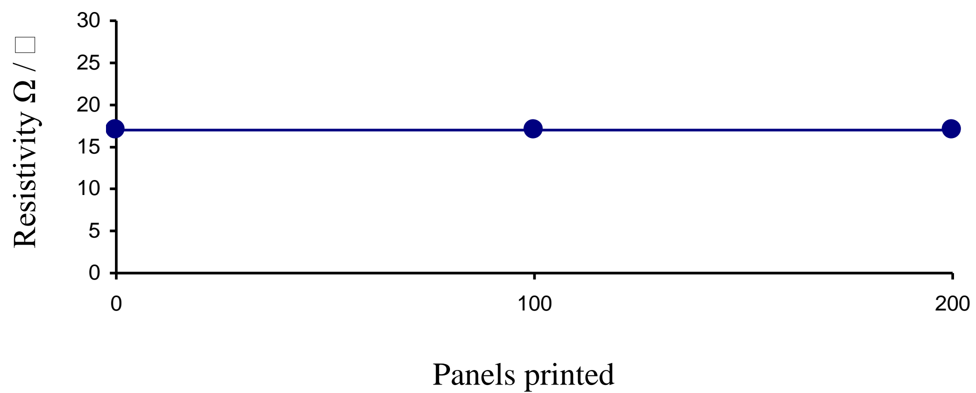

Fig. 7 Change of Film Thickness

7. MRX-713J Curing Conditions

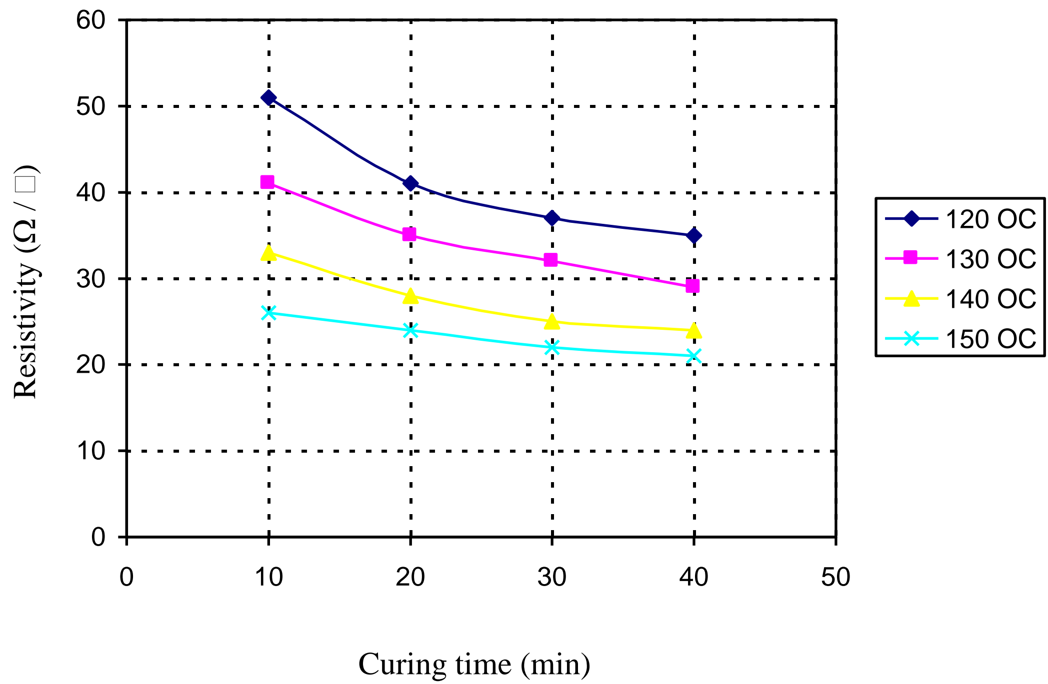

Fig 8 Curing condition vs Resistivity (15 μm)

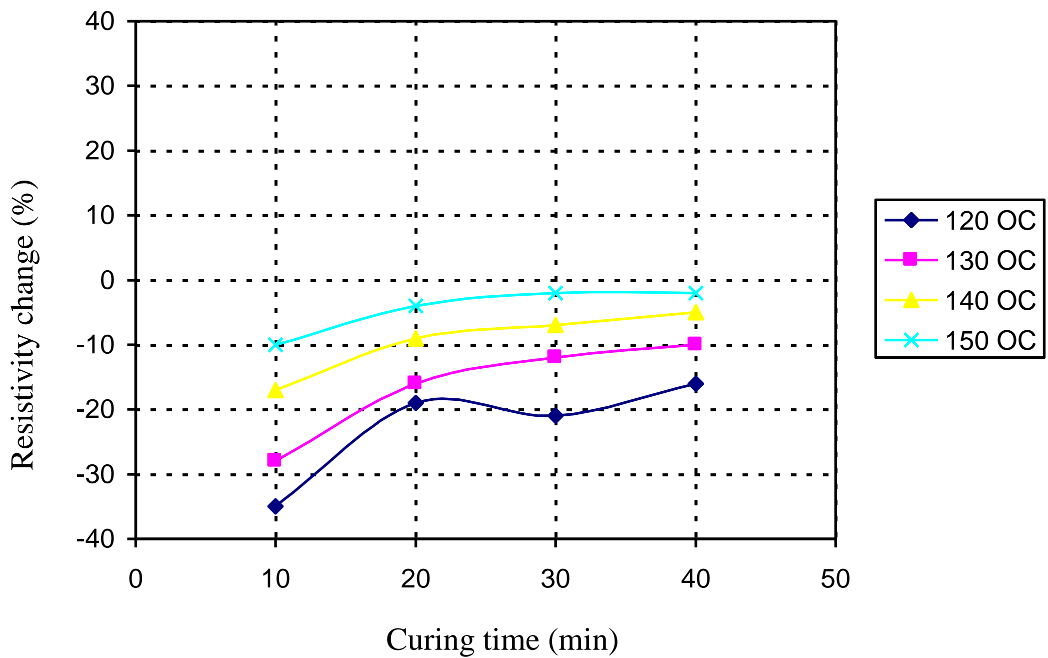

Fig 9 Curing condition vs Resistivity change after soldering

Table 4 : MRX-713J Adhesion vs. IR Furnace Passes

Pass Number	Solder Dipped 260°C, 10 sec, 5 times	Not Solder Dipped
0.5 Times (double speed)	good	good
Once	good	good
Twice	good	good
3 times	good	good

8. MRX-713-J STUDY OF RE-USE

Table 5 : Reuse of MRX-713J

	Units	Initial	200 Panels	Kept 4 Days & Visco adjusted
Viscosity	ps	300	500	1000 - 350
Sheet Resistivity	ohm/sq	31	32	32
Film Thickness	micron	19	21	20
Solder Heat Resistance - Change of Resistivity - Adhesion on Copper	% %	-3 good	-5 good	-1 good
PEELCOAT curing resistance	%	-1	-3	-3
PEELCOAT solder dipping - change of resistivity	%	-4	-4	-4
Adhesion on Copper		good	good	good

9. ABRASION RESISTANCE

When the Carbon paste is subject to abrasion due to a moving contact across the surface of the cured carbon layer the following items should be noted.

- The shape of the material in contact with the carbon layer should be as smooth as possible to reduce the abrasive effect.
- The end user should satisfy themselves under test conditions that the carbon layer will fulfil their requirements for abrasive resistance. These tests should be carried out to determine the reliability of the carbon layer and would hence be an indicator of the products performance under end user conditions
- Tamura Kaken is not liable for guaranteeing the abrasion resistance as each condition of use is different.