

MEMORANDUM



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MEO-PEDIA 100418 V3.1



INKTEC

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EXPERIENCE LEADING-EDGE TECHNOLOGY & INNOVATIVE PRODUCTS

CONDUCTIVE INKS

- INKJET INK
- PASTE INK_ FOR FLAT, ROLL TO ROLL SCREEN PRINTING
- COATING INK_ FOR SPIN, DIP COATING
- PRINTING INK_ FOR FLEXOGRAPHY, GRAVURE PRINTING

ADVANCED FUNCTIONAL FILM

- SILVER REFLECTIVE FILM
- EMI SHIELDING FILM
- BLACK INSULATION FILM

ADVANCED PRINTED CIRCUIT MATERIAL

- FSCL (FLEXIBLE SILVER COATED LAYER)
- HYBRID FCCL



INNOVATIVE TECHNOLOGY

InkTec have concentrated our R&D resources on developing state of the art technology in Printed Electronics under the motto of "Today's technology is never good enough for us". As a result of these efforts, InkTec invented transparent silver nano ink and commercially introduced TEC ink under the InkTec's creative technology which is employed in activation of capping agent and making ag cluster complex strengthening the competitiveness of high-efficient conductive power, adhesive power, surface roughness.

WIDE RANGE OF SELECTION AS CUSTOMER'S NEEDS

InkTec is supplying the printed electronic materials such as inkjet, hybrid silver paste, coating and printing inks which can be easily applied to the various types of printing process from laboratory instrument to mass production line. Furthermore, we will expand our product line such as ceramic, molecular inks and applications in printable electronic & display field. With these efforts, we are trying to meet customer's requirement.

STABLE BUSINESS BASED ON TRUSTY-WORTHY IPR (INTELLECTUAL PROPERTY RIGHTS)

After jumping into business area of Printed Electronics, InkTec has achieved a lot of technological accomplishments. Not only gaining a profit but also developing printed electronics market, we have obtained many intellectual properties both material-wise patents and processing-wise patents. This will help our customers to maintain their long-term and stable business.

MOST COMPETITIVE CUSTOMIZING ABILITIES

InkTec provides total solution including optimized materials and manufacturing process to our customers based on our accumulated core technology and know-how in manufacturing process.

As a core-technology, InkTec can control the amount of silver contents, the size of silver particles and viscosity of our silver inks. Also we can offer streamlined and customized manufacturing method in accordance with customer's request or need. As a consequence, we can add more values to our customers with a wide range of choices and make easier to hit the bull's-eye on our customer's end.

INKTEC LEADS NEW PARADIGM IN PRINTED ELECTRONIC MATERIALS

InkTec provides a wide range of products such as conductive inks and printed electronic materials. InkTec can offer customized inks and printed applications for Customer's requirement using our superb formulation technology and the cutting edge printing facilities.

LOCATION & FACILITY



ANSAN 1ST PLANT

Headquarters

- Production facility & RD (UV Printer) of PS (Printing System)
- Production facility of Patterned application



ANSAN 2ND PLANT

Intelligent Building Management System R&D, Production Facilities

- Ink manufacturing facilities (Reactor, Mill etc.)
- Production Line for ink injection, suction and sealing
- Test Equipment (Weather-O-Meter, HPLC, GC, FTIR, NMR and XRF, etc.)
- Special coating line



PYUNGTAEK PLANT

Intelligent Building Management System

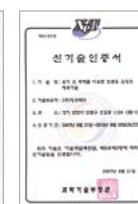
- ISO 9001 & 14001 compliant facilities and processing
- All Printing Facilities in clean room (Class 1,000~10,000)
- Ink Production, Printing Facilities (3 lines) and QM.
- Direct Gravure, Micro Gravure, Rotary Screen with inline inspection and alignment equipment
- Laminating and Slitting Facilities

HISTORY

- 1992** Established InkTec Co., Ltd
- 1993** Certified of the KT (Korean Technology) Mark
- 1996** Received the IR52 Jang Young Shil Award (Minister of MOST Prize)
- 1998** Awarded the Export Achievement Trophy for US\$ 1million
- 2000** Expanded and relocated the headquarters and plant (Ansan, Gyeonggido)
Awarded the Export Achievement Trophy for US \$5 million by KITA
Certified of ISO 9001 by Korea Management Association
- 2001** Awarded the Export Achievement Trophy for US \$10 million by KITA
- 2002** Company Registered in KOSDAQ on Feb. 28, 2002
Achieved New Technology (NT) Mark for Solvent-based Inks for Inkjet Printer
- 2003** Certified for CE
Certified for ISO 14001 Environmental Management System
- 2004** Designated as Advanced Technology Center by MOCIE
(Electronic materials in inkjet applications Designated as Advanced R&D Cluster by KOITA)
- 2005** Unveiled 'Transparent electronic Ink', an advanced electronic new material
Selected for 'Parts and materials technology development project' by the Ministry of Industry, Commerce and Energy
Constructed Pyeongtaek Plant (Poseung, Gyeonggido)
- 2006** Completed Pyeongtaek Pant
- 2007** Constructed new production lines for the electronic materials (Poseung, Gyeonggido)
Certified for NET(New Excellent Technology) by the minister of science and technology
- 2008** Received the IR52 Jang Young Shil Award and the best Jang Young Shil Award by Prime Minister
Awarded the Export Achievement Trophy for US \$20 million by KITA
- 2009** Certified for PEEA 2009(Printed Electronics Europe Award 2009) by the IDTechEX
Certified 'NET (New Excellent Technology for Ag Reflective Film)' by Ministry of Science and Technology
Won the 'King Sejong Patented Technology Prize' by the Korean Intellectual Property Office
- 2010** Certified for Green Technology by Ministry of Education Science and Technology
- 2011** Awarded the Export Achievement Trophy for US \$30 million by KITA
- 2012** Jetrix 2513 awarded Best Specialist Printer by European Digital Press Association
- 2013** InkTec designaged as World class 300 company
Awarded the Export Achievement Trophy for US \$50 million by KITA
- 2014** Relocated and expanded the headquarters (98-2 Neungan-Ro, Ansan)



Certification for Nano Industry Technology (MOCIE)



Certification for New Technology (MOST)



The best Jang Young Shil Award



PEE Awards from IDTechEx



Award for the large export achievement



Certification for ISO 9001/ 14001



Certification for ATC (Advanced Technology Center)



Decoration for the Order of Industrial Service Merit

CONDUCTIVE INKS

- 01 INKJET INK • IJ SERIES
- 02 PASTE INK • PA SERIES
- 03 COATING INK • CO SERIES
- 04 PRINTING INK • PR SERIES

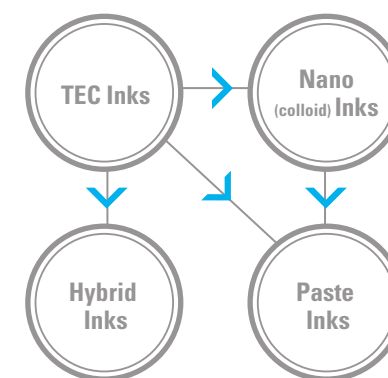
CONDUCTIVE INK MANUFACTURER, INKTEC

Based on our deep experience and high reputation as an ink manufacturer in IP (Image Printing) market, InkTec proudly introduces our TEC (Transparent Conductive Electronic) Inks which are distinctively formulated compared with conventional conductive inks in the previous marketplace.

DISTINGUISHED TECHNOLOGY OF INKTEC, TEC INK

TEC is different from other conventional conductive inks based on nano-technology, InkTec ink is formulated by soluble silver cluster & complex structure. The ink is transparent before curing because silver is solved with a nano-particle size in solvent. But it is metalized in a high density and uniformed surface with superior conductivity after curing

TEC inks make up for the weak points of other nano particle inks in a certain point of view such as stability, thickness, low temperature curing. And InkTec offers customized ink for various customer's printing method such as inkjet, screen, offset, flexography and gravure by customizing abilities in viscosity and formulation of inks.



Good conductive through forming thin layer
Reduction of raw material



Available for Various Printing Methods
Inkjet, Flexography, Off-set, Screen, Gravure, etc.

INKJET INK

Differently from other prior conductive inks based on nano-technology in the marketplace, InkTec's Inkjet ink is not formulated by particle structure so it is stable even in a room temperature and optimized in printing fine patterns.



IJ SERIES

APPLICATIONS

OTFT, Memory Cell, Display, RFID and so on

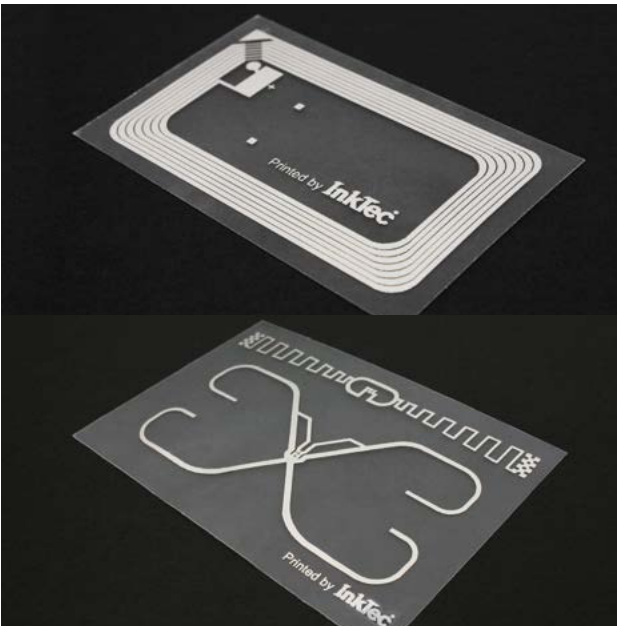
PRODUCT FEATURES

- Sub-nano particle size
- Jetting stability & Compatibility with various kinds of print heads
- Short Curing Time in a Low-temperature
- Optimization in Fine Pattern & Thin Layer

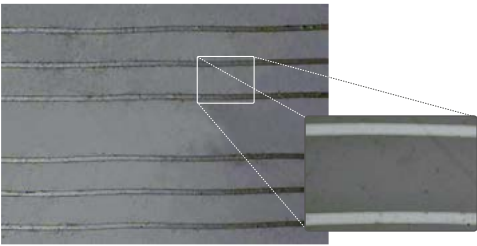
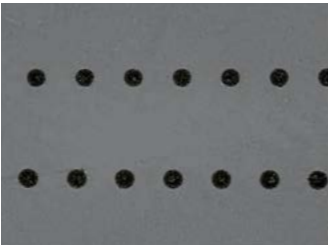
INK PROPERTIES

Classification	TEC-IJ-010	TEC-IJ-060 *
Particle Size	None particle based ink	None particle based ink
Curing Temp (IR & Circulating heat oven)	130-150 (5-10min)	130-150 (5-10min)
Layer Thickness (After curing)	323nm (210dpi)	341nm (1350dpi)
Volume Resistivity (Ωcm)	4.2×10^{-6}	8.35×10^{-6}

The above information is based on the test result in our lab.
The result can be changed according to your printing method or test environment. (Bulk Silver resistivity : $1.6 \times 10^{-6} \Omega \text{cm}$)
* Compatible with ITO coated substrates



TEC-IJ-010 (for Dimatix 1pl Cartridge) Printed Image



Element ID : 3
Element Type : M4 - Circle CR
Element Label :
Feature Actual
X_Crd 2.9098
Y_Crd -0.0395
D 0.0325
R 0.0163
Circular 0.0000

PASTE INK

InkTec paste inks can be used for vulnerable substrates to high temperature (Paper, PET and so on) as well because it is possible to be metalized in low temperature within a short time after printing. TEC-PA series has a high density after curing because it has few or no gap between particles. That is why our ink can materialize fine pattern with high conductivity.



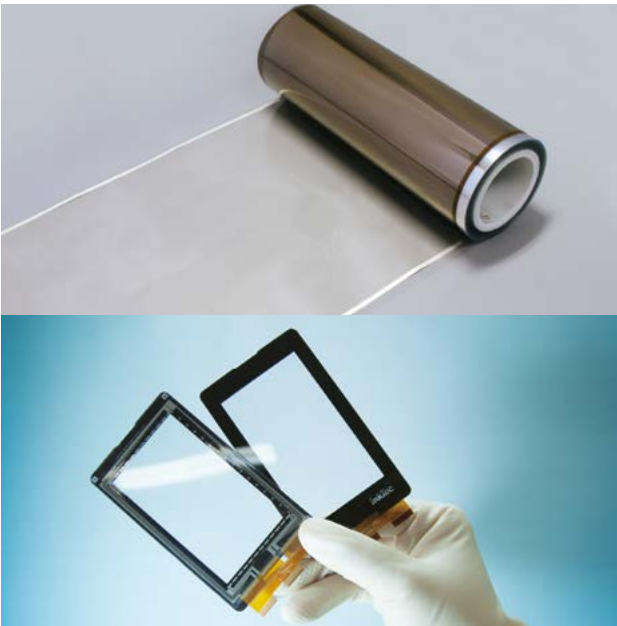
PA SERIES

APPLICATIONS

Touch Panel, Solar Cell, Display, EMI Shielding, RFID and so on

PRODUCT FEATURES

- Optimization in Fine Pattern & Thin Layer
- Short Curing Time in a Low-temperature



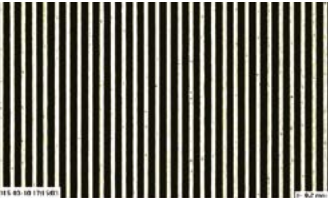
INK PROPERTIES (FOR SCREEN PRINTING)

Classification	Patterning Method	Curing Temp. (Convection oven)	Layer Thickness (After curing)	Volume Resistanceon ITO (Ωcm)	Remark
TEC-PL-010	Screen	100°C (30min)	6-8 μm	Max 6.5×10 ⁻⁵	low curing temp.
TEC-PA-010 *	Screen	100 ~ 130°C (2~5min)	1-2 μm	Max 6.0×10 ⁻⁶	Binder free
TEC-PA-051 LV	Screen	130°C (20min)	6-8 μm	Max 6.5×10 ⁻⁵	-
TEC-PA-051	Screen	130°C (20min)	6-8 μm	Max 6.5×10 ⁻⁵	-
TEC-PA-060	Screen + Laser	130°C (20min)	5-6 μm	Max 6.5×10 ⁻⁵	-
TEC-PA-060S	Screen + Laser	130°C (20min)	4-5 μm	Max 6.5×10 ⁻⁵	-
TEC-PA-070	Screen	130°C (20min)	6-8 μm	Max 3.0×10 ⁻⁴	Hybrid Ink
TEC-PA-088	Screen + Laser	130°C (20min)	4-4.5 μm	Max 6.5×10 ⁻⁵	For Ultra fine pattern
TEC-PS-C10	Screen	130°C (20min)	-	Max 6.5×10 ⁻⁵	For car display
TEC-IM-C10	Imprinting	110°C (20min)	-	9.0×10 ⁻⁵	For metal mesh

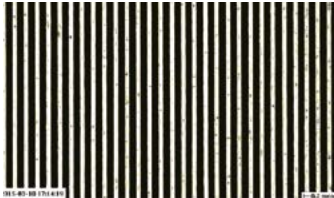
* Depending on substrates, it might be needed a primer treatment to improve adhesion

LASER PATTERN : MICROSCOPE IMAGE (DARK FIELD MODE)

* TEC-PA-060 (L/S=30μm/30μm)



* TEC-PA088 (L/S=20μm/20μm)



COATING INK

InkTec Coating Ink is the new type of metallic ink developed by our original technology. Our product is environment-friendly because of no waste water like a conventional plating process and also has high productivity with a fast production speed and easy controllability of the viscosity. That's why our product can be applied to various coatings method such as roll to roll coating, spray coating and dip coating.



CO SERIES

APPLICATIONS

Decoration for mobile phone case, automobile, home appliances and architecture industry and so on.

PRODUCT FEATURES

- Applicable to various substrate – plastic, Al, Mg and so on
- High reflectance & mirror effect with thin & uniformed layer
- Low manufacturing cost and Environment-friendly production process

INK PROPERTIES

Item	TEC-CO-011	TEC-CO-021
Printing Method	Spray/Dipping	Spray/Dipping
Curing Temp.	120°C (3-5min)	80~120°C (3-5min)
Layer Thickness (After curing)	100 - 150nm	100 - 150nm

To use our coating inks, surface treatment or top coatings is required

COMPARISON OF COATING PROCESS

Classification	InkTec Coating Ink	Plating	Vacuum Plating
Cost	Low cost (Low material cost & use of the existing facilities)	Low cost	Cost increase due to the initial facility
Production Efficiency	Easy production & simple process	Not bad	Low production Efficiency
Environmenta Pollution	Environmental friendly without wasted water	Use of much of wasted water/ Use of mass amount of toxic substances	Environment-friendly
Quality of finished product	Good metallic feel	Various Metallic feel but low quality (Blot, Inferiority)	Even metallic feel



PRINTING INK

InkTec printing ink is the new type of metallic ink developed by our original technology and optimized for gravure, flexography printing. We can also control silver contents, viscosity and formulation of our silver conductive inks and can be adapted a various kinds of production process according to the specification of customer's requirement. We can help our customers to reinforce competitiveness with our printing inks and roll to roll printing production process.

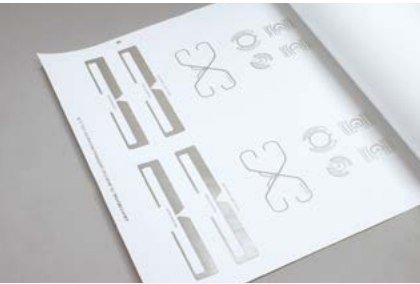
PR SERIES

APPLICATIONS

Flexible electronic materials such as memory, display electrode and functional films and so on.

PRODUCT FEATURES

- Thin layer with high conductivity
- High productivity by wide and fast roll to roll printing
- Optimized inks for Flexible substrate



INK PROPERTIES

Classification	TEC-PR-010	TEC-PR-041
Printing method	Gravure, Flexography	Gravure, Flexography
Curing Temp	120°C~170°C(2-5min)	130°C (20min)
Layer Thickness (After curing)	1μm	1μm
Viscosity (Brookfield LV DV-II+ PCP@1rpm)	< 100cPs	< 400cPs
Adhesion (on PET film, ASTM D 3359 rating)	4~5B	4~5B
Volume Resistivity (Ωcm)	5×10 ⁻⁶	10×10 ⁻⁶

The above information is based on the test result in our lab.
The result can be changed according to your printing method or test environment.
(Bulk Silver resistivity : 1.6 X 10⁻⁶Ωcm)

ADVANCED FUNCTIONAL FILM

- 01 SILVER REFLECTIVE FILM
- 02 EMI SHIELDING FILM
- 03 BLACK INSULATION FILM

NEW CHALLENGER IN FUNCTIONAL FILM MANUFACTURER, INKTEC

InkTec provides the fitted printed electronic products for customer's products using our superior printing facilities and our own electronic inks.



FACILITIES

Our production line is optimized for mass production in faster time. For maximizing customer satisfaction, we adopted various roll to roll printing facilities & intelligent and eco-friendly system. On top of these equipments, we do have our own manufactured superb inks; therefore, InkTec can meet customer's order in shorter lead time with much better quality among competitors in Printable Electronic industry.

CAPACITY

Spec	Line 1	Line 2	Line 3
Max width of printing(mm)	~ 350	~ 1600	~ 1600
Annual production capacity(m ² /yr)	~ 1,800,000	~ 10,000,000	~ 10,000,000
Available printing	Direct Gravure Micro Gravure Rotary Screen S-knife/Comma Flexography	Micro Gravure S-knife/Comma	Direct Gravure Micro Gravure Rotary Screen

SILVER REFLECTIVE FILM

Using InkTec's own 'Transparent Silver Ink' and superior Roll to Roll printing production line, InkTec provides the silver reflective film having a high reflectance.



APPLICATIONS

Cellular phone, Tablet PC, LCD TV, LCD Monitor, Notebook, MP3 Player, Digital camera , Navigation, LED lighting, etc.

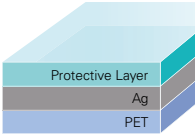
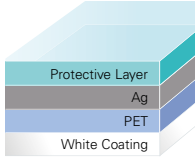
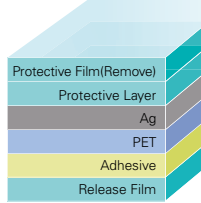
PRODUCT FEATURES

- High Reflectance
It materializes high reflectance of the dense and uniformed surface of the reflective film.
- High Grade Properties
Due to a top clear protective layer, it can not only minimizing the diffused reflection, pollution level and yellow stain, but reinforcing properties of anti-scratch, moisture proof and corrosion proof.
- Very Short Lead Time
We can provide our products in very short lead time because we churn out our novel silver reflective film using the high speed roll to roll printing process. We print reflective film by our own printing line with transparent silver ink developed and produced by ourselves.

SILVER REFLECTIVE FILM FOR LCD BLU

Model	HE050 / HE070	HB070	HW075 (New Type)	HL075 (New Type)	High- Luminance Reflective Film	Remark
Structure						
Reflectance (%) (380nm ~780nm)	Over 97	Over 97	Over 97	Over 97	Over 99	* According to the KSA0066 standards *Lambda-650s UV/VIS spectrometer / Perkin Elmer
Thickness (μm)	60±6, 70±7	70±7	80±10	80±10	About 75	Micro Meter
Reliability	Qualified	Qualified	Qualified	Qualified	Under Development	Thermal Shock Heat resistance HumidityResistance

SILVER REFLECTIVE FILM FOR LED LIGHTING

Model	FRF-00- HA038	FRF-00- HA200	FRF-00-HP050	Measurement Method
Structure				-
Reflectance (%) (380nm ~780nm)	Over 96%	Over 96%	Over 97%	* According to the KSA0066 standards * Lambda-650s UV/VIS spectrometer / Perkin Elmer
Thickness ()	52±5	210±20	205±20, 193±20	Micro Meter
Reliability	Qualified	Qualified	Qualified	Thermal Shock Heat resistance Humidity Resistance

EMI SHIELDING FILM

EMI or Electro Magnetic Interference Shielding Film consists of high conductive metal layer with insulation layer and high conductive adhesive layer. Currently, FPCs are being widely used in Cellular phone, Tablet PC, Laptop computer, LCD, OLED, PDP and the other electronic equipment for wiring because of characteristics of its high bendability, high density catching up with mainstream of IT device shown in a “more lighter, thinner, shorter, smaller” Especially, FPCs is in the center of these trend and require high performance of EMI shielding; therefore, InkTec developed EMI shielding Film with a high flexibility and high performance of shielding to satisfy customer’s needs.

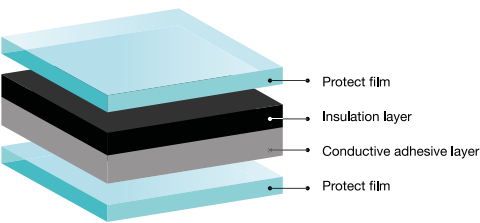
APPLICATIONS

Cellular phone, Tablet PC, Laptop computer, MP3 Player, Digital camera, PDA, Navigation, etc.

PRODUCT FEATURES

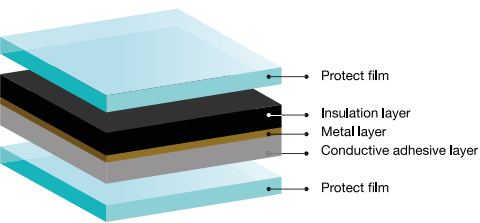
- Easiness of pre-treatment & after-treatment in a low temp.
- High Shielding Effect
- High Chemical Resistivity
- Excellent Heat Endurance (Solder)
- High Peel Strength (Bonding sheet)

ICA Type



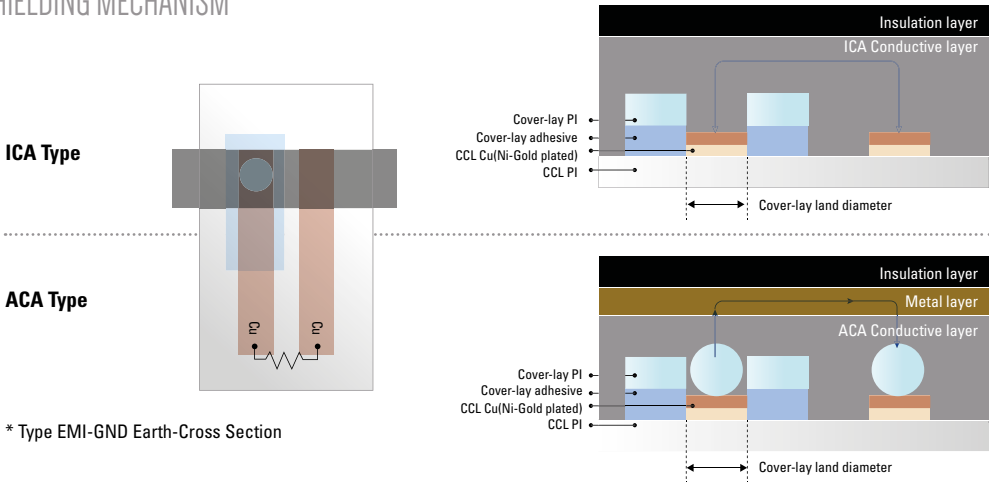
- **Insulation**
Excellent Heat & Chemical Resistance
- **Conductive Adhesive**
Excellent Shield Effect & Conductivity
- **Flexibility**
Good Flexibility(Slide & MIT)
- **Superior Reliability**
High temperature & humidity-resisting / Salt water-resisting/ Cold-heat shock resisting
- **High Step Reliability**

ACA Type



- **Good adhesion function between layers**
- **Superior Reliability**
High temperature & humidity-resisting / Salt water-resisting/ Cold-heat shock resisting
- **Good compatibility with insulation material**
Chemical-resisting/ Solder heat-resisting
- **Metal layer Flexibility**
Slide flexibility/ MIT flexibility
- **Thin EMI Shielding Film**

EMI SHIELDING MECHANISM



ICA TYPE vs ACA TYPE COMPARISON

Model	ICA Type	ACA Type
Advantage	<ul style="list-style-type: none">· Good Heat & Chemical Resistance· High shielding effect· Good conductivity for ground size· Good Reliability· Easy to strip the Protect film· High efficiency in pre-fixing	<ul style="list-style-type: none">· Good Heat & Chemical Resistance· Good Flexibility· More Thinner type· Flex Conductivity· Good Reliability· Easy to strip the Protect film· High efficiency in pre-fixing
Thickness(After Press)	16 μ m~22 μ m	10 μ m~14 μ m
Step Conductivity	Excellent	Good
Conductivity for Ground size	Excellent	Good
Shield effect	> 55 dB	> 50 dB
Conductivity [3cm, 2mm Φ , after baking]	< 0.3 Ω	< 0.7 Ω
Pre-Treatment	<ul style="list-style-type: none">· Pre-Fixing : ☉· Strip the Protect Film : ○	<ul style="list-style-type: none">· Pre-Fixing : ○· Strip the Protect Film : ○

BLACK INSULATION FILM

Black Insulation Film with high performance consists of double layers: one is insulation layer and the other is the adhesive layer without PI film. Currently, the demand of black cover-lay in FPCs' market is increasing for preventing 'Reverse Engineering'. InkTec black insulation film is developed to replace the conventional black cover-lay of high performance with thinnest layer, high flexibility to satisfy customer's needs.



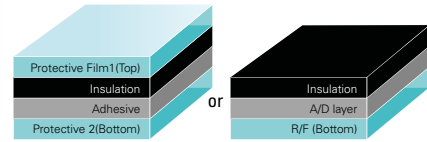
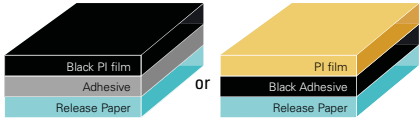
APPLICATIONS

Cellular phone, Tablet PC, Laptop computer, MP3 Player, Digital camera, PDA, Navigation, etc.

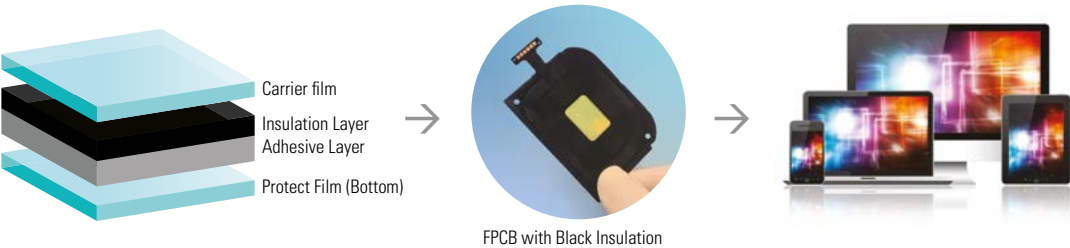
PRODUCT FEATURES

- High chemical resistivity
- Excellent heat endurance
- Easiness of pre-treatment & after-treatment in a low temp.
- Adaptability in Thin FPCB
- Good compatibility with post processing (Lamination, Marking print, converting, etc...)

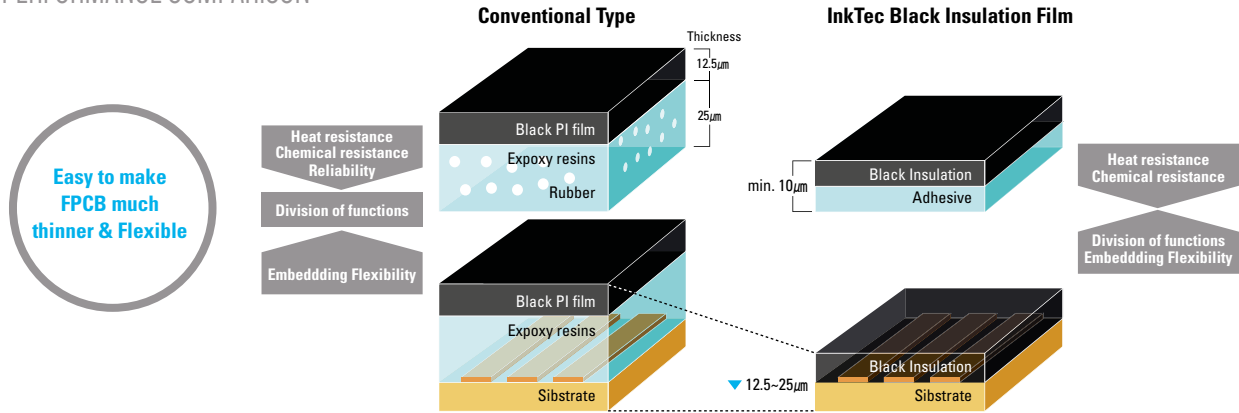
COMPARISON OF COATING PROCESS

Product		Black Insulation Film	Conventional Type
Structure			
Spec.	Protect Film (Top)	Release PET (50~100μm) or X	X
	Insulation	Black color, min 5μm	PI film 25~7.5μm
	Adhesive	Adhesive, min 5μm	Modified Epoxy Resin based, 15~40μm
	Protect Film (Bottom)	Carrier PET, 50~150μm	Resin coated paper, 115μm

APPLICATION PROCESS



PERFORMANCE COMPARISON



PROPERTIES

Properties			Unit	BT-Series	Test Method
Thickness	Insulation Layer & Adhesive Layer			Min Type : 10 Max Type : 25	Micrometer According to market needs, it can be adjusted to its thickness within the range
	Protect Layer	Carrier	μm	50~100	Micrometer
		Protect	μm	50~150	Micrometer
Solder Floating			Pass/ NG	Pass	Lead soldering by dipping method(288°C, 10sec)
Chemical Resistance			De-lamination	Pass	NaOH 5%, 50°C, 10min dipping HCl 5%, 50°C, 10min dipping Zestron FA+, 50°C, 10min dipping

ADVANCED PRINTED CIRCUIT MATERIAL

- 01 FSCL (FLEXIBLE SILVER COATED LAYER)
- 02 HYBRID FCCL

NEW PARADIGM IN PRINTED CIRCUIT MATERIALS, INKTEC

InkTec provides the competitive printed circuit materials such as FCCL with our own conductive Ink and superior Roll-to-Roll printing line. We are continuously expanding the printed applications through Intensive R&D Investment and effort toward performance improvement.



FACILITIES

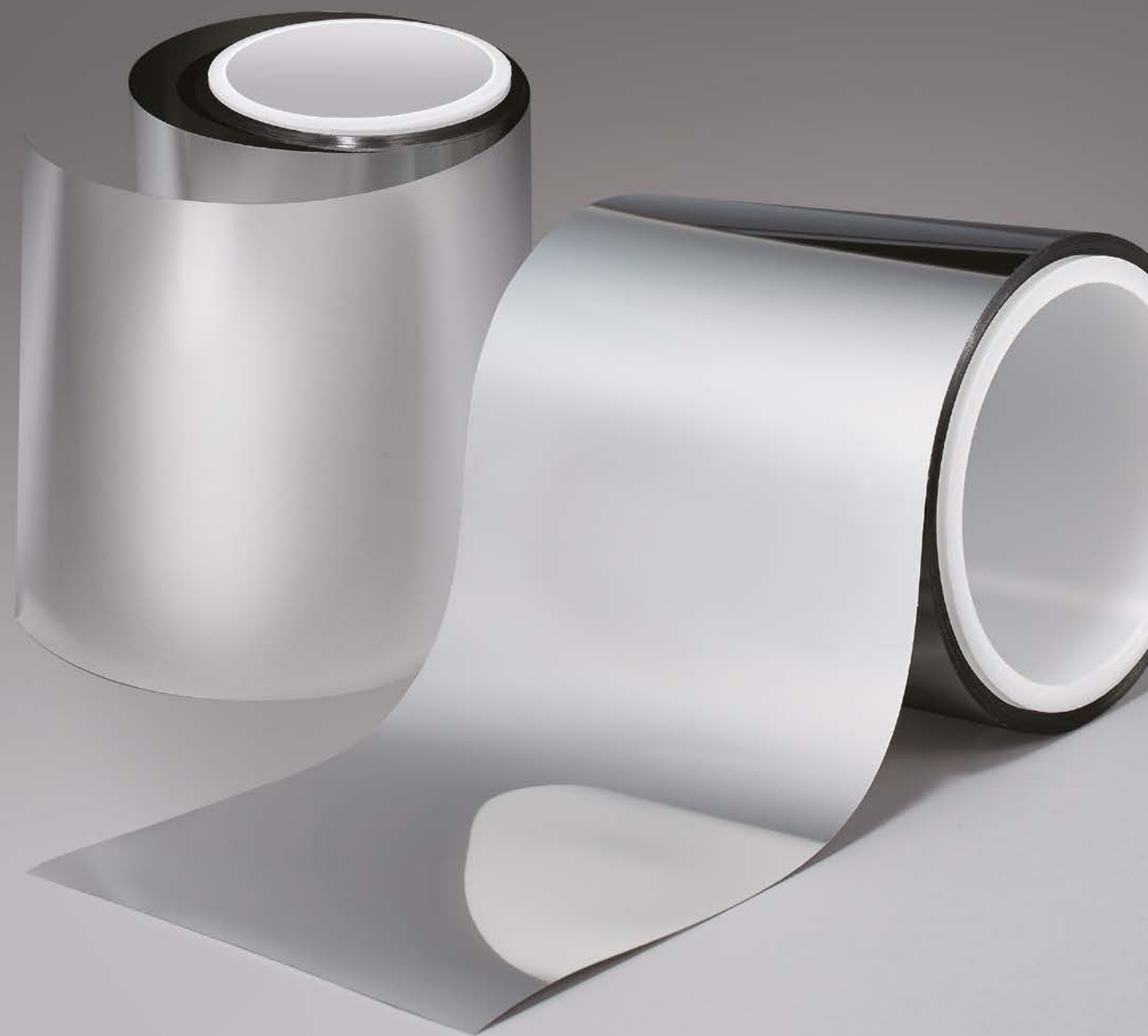
		Facilities	Type	Width
Production	Printing	Screen	R2R, Sheet	600mm
		Flexography	R2R	~350mm
	Coating	Gravure	R2R	~1,200mm
	Plating	Electro Plating	R2R	600mm
	D.E.S	-	Sheet	500mm
	S/E	-	Sheet, R2R	600mm
	Puncher	-	R2R	500mm
	L.D.I	-	Sheet	600mm
	D/F LAMI	-	Sheet, R2R	500mm
Inspection	Demension	3D Measurement	Sheet	~1,050mm
	Appearance	AOI	Sheet	~750mm
	Open/Short	BBT	Sheet	~610mm

FSCL

FLEXIBLE SILVER COATED LAYER

InkTec FSCL (Flexible Silver Coated Layer) is a new type of substrate film manufacturing FCCL by electro-plating process.

Ultra thin FCCL ($3\mu\text{m}$ of thickness) can be more easily produced by simple electro-plating on the surface of silver coated layer.



APPLICATIONS

Ultra thin FCCL by electro-plating process

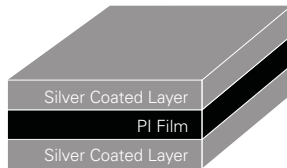
FPCB for ultra fine pattern by SAP (Min. $15\mu\text{m}/15\mu\text{m}$)

Substrate film for COF by SAP (Under development)

PRODUCT FEATURES

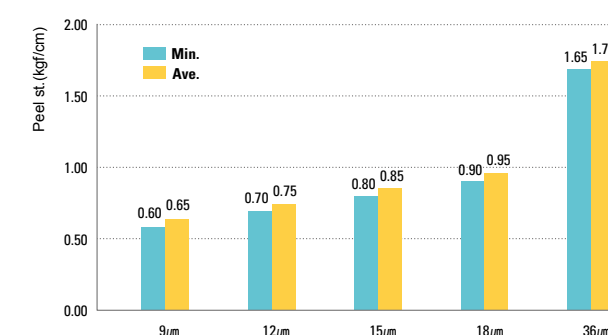
- Adjustable Cu plating thickness
- Available TH (Through Hole) FSCL → Process simplification
- Optimal substrate for ultra fine pattern sharp
 - Excellent etching factor (More than 8)
 - Minimization of pattern shape damage by selective pattern etching when flash etching

STRUCTURE OF FSCL (FLEXIBLE SILVER COATED LAYER)

Structure	Thickness	Remark
	Silver Coated Layer : $0.15\mu\text{m}\sim 0.25\mu\text{m}$	Thickness of Silver Coated Layer can be changeable by products
	PI Film : $\frac{1}{2}$, 1, 2 mil	

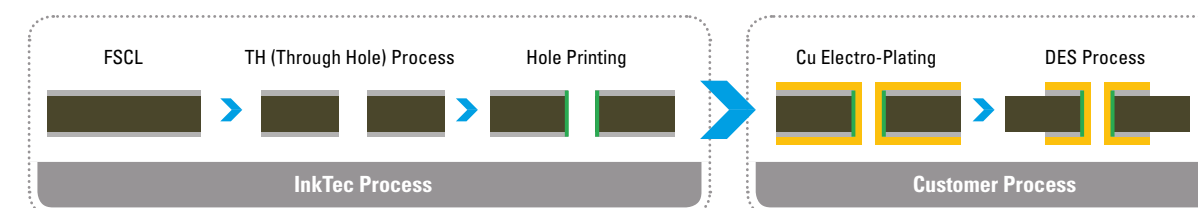
PROPERTIES

Classification	Measurement
Thickness	$0.15\mu\text{m}\sim 0.25\mu\text{m}$
Sheet Resistance	200 ~ 400m Ω



<Peel Strength by thickness>

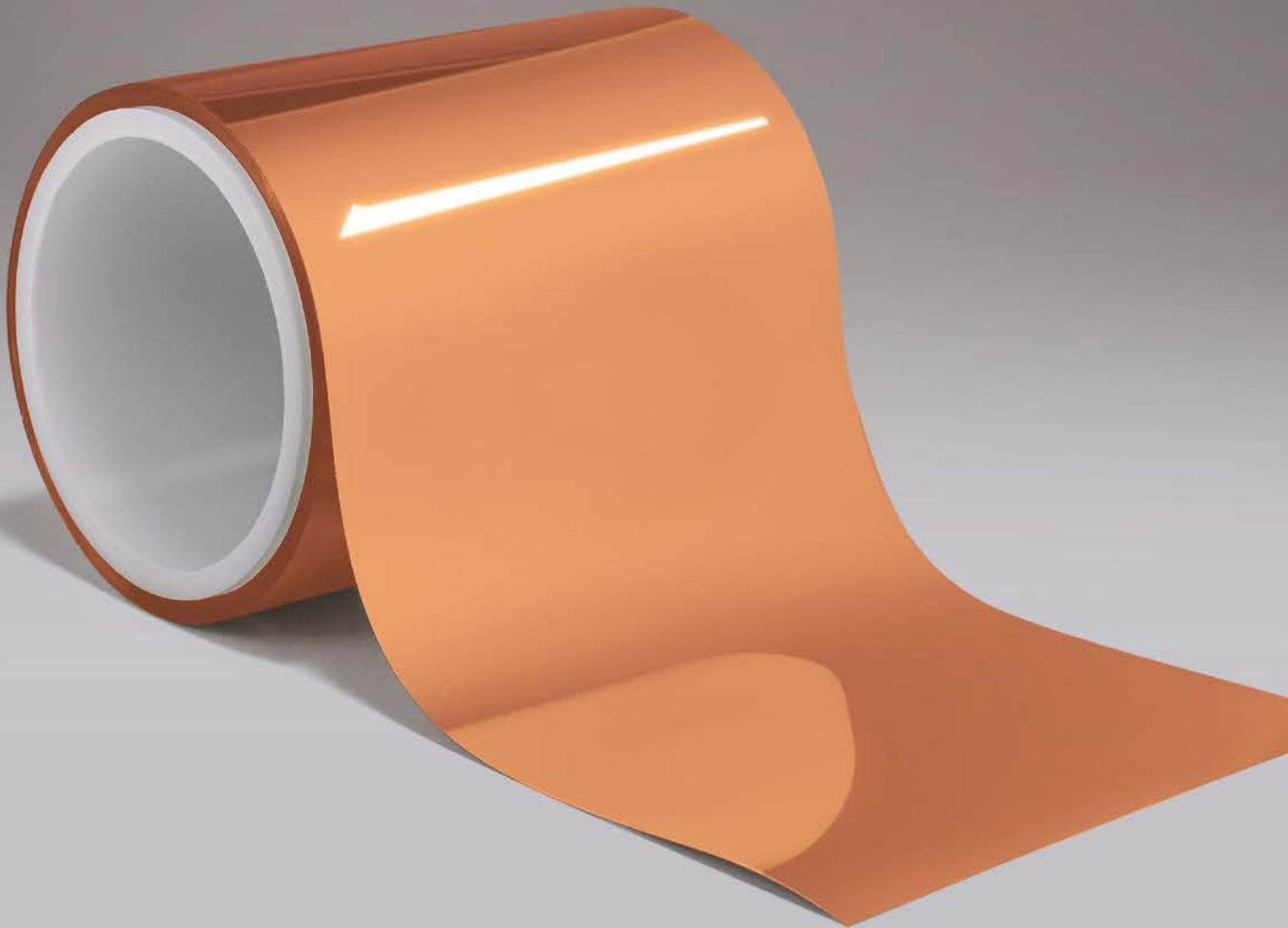
SIMPLE PTH PROCESS



HYBRID FCCL

FLEXIBLE COPPER CLAD LAMINATE

InkTec Hybrid FCCL is newly developed FCCL by using InkTec’s own Ink and superior Roll to Roll electro-plating production line. It is not required for half-etching which can be shortened production process due to ultra thin thickness with InkTec Hybrid FCCL.



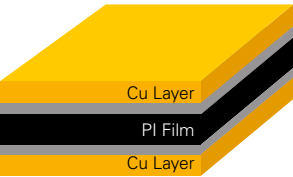
APPLICATIONS

FPCB for ultra fine pattern
Thinner FPCB

PRODUCT FEATURES

- Ultra Thin Thickness (3μm~) / Unnecessary of half etching process
- Available TH (Through Hole) FCCL → Process simplification
- Excellent surface roughness
- Uniformity of Cu thickness

STRUCTURE OF FCCL

Structure	Thickness	Remark
	Cu Layer : 3μm ~ Silver Coated Layer : 0.15μm ~ 0.25μm PI Film : ½, 1, 2 mil	Thickness of Silver Coated Layer can be changeable by products

PROPERTIES

List		Pass Level	Result	Test Condition	
Cu Thickness uniformity		< ±1μm	± 0.5μm	Micro Section	
Peel Strength	Initial	> 0.60kgf/cm	0.70	Cu : 12μm (+9μm)	IPC TM 650 2.4.9
	After Aging	> 0.40kgf/cm	0.65	150℃ 168hr	
MIT Test	W/O C/L	> 100times	120	L/S 100μm / 500μm	JIS C 5016
Solder Test		No Blister	PASS	288/300℃ 10sec. 3 cycles	IPC TM 650 2.4.13
Dimensional Stability (MD/TD)	After Etching	< ± 0.1%	0.03 / 0.05%	-	IPC TM 650 2.2.4
	After Heating	< ± 0.1%	0.00 / 0.01%	150℃ 30min.	
Chemical Resistance	IPA / 2N-HCL / 2N-NaOH	No Blister	PASS	5min. Dipping	JIS C 6471
Tensile Strength (MD/TD)		-	470/350 Mpa	L 150mm x W 13mm Grip separation 100mm Speed 50mm/min	IPC TM 650 2.4.19
Tensile Modulus (MD/TD)		-	17/19 Gpa		
Tensile Elongation (MD/TD)		-	14/19 %		
Surface Roughness (Ra/Rz)		< 0.1μm / 1μm	0.015μm / 0.158μm	AFM	
Ion Migration		> 1.0∧6Ω	PASS	DC 24V, 85℃ 85%, 500hr. L/S 100/100μm Under Test (~1,000hr)	IPC TM 650 2.6.3