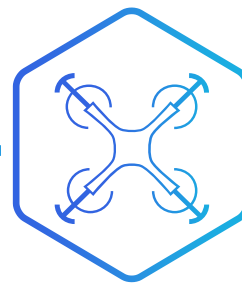
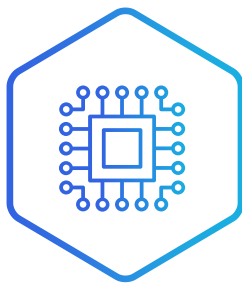




PI Advanced Materials

Polyimide Connecting Tomorrow

ZENIMID™



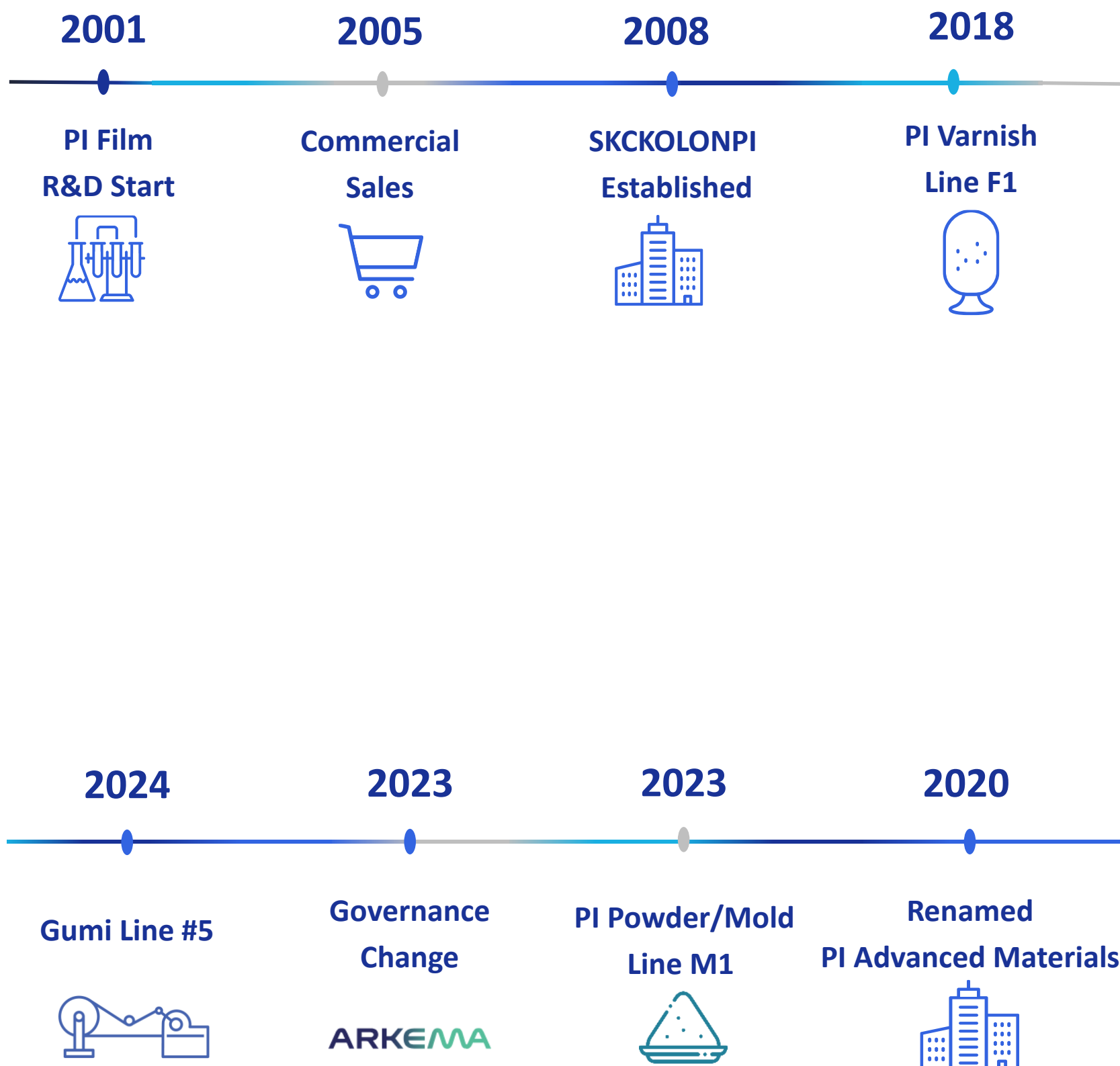
PI Advanced
Materials
an Arkema affiliate

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Company History

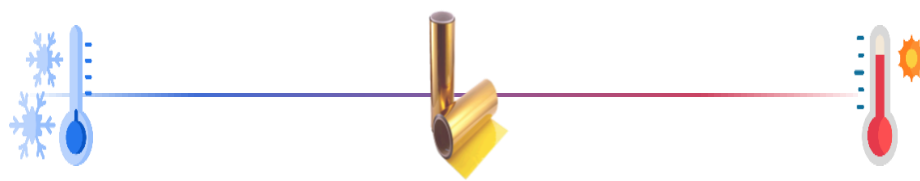
Global No.1 Polyimide Film Maker - PIAM



Characteristics

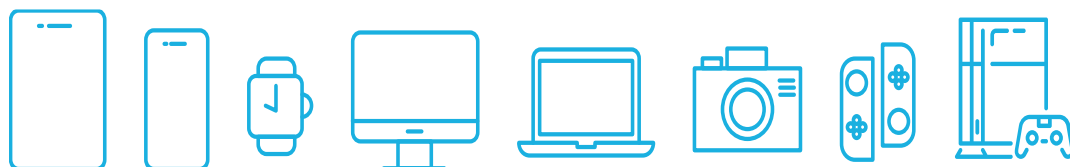
◆ Key characteristics of PI Film

- Super engineering plastic with excellent resistance, dimensional stability and insulation properties for advanced high functional applications.



◆ Applications

- PI film was first invented as an insulator in satellites for NASA in the 1960s.
- Mostly used in FPCBs, essential base materials for IT devices such as smartphones, its application has expanded into a variety of industries including semiconductors and graphite sheets.
- Demand for PI is growing with light weighting, miniaturizing trends in IT devices and the growth of flexible & wearable mobile devices.
- Materials for EV motor insulation, flexible displays and semiconductors are expanding applications thanks to the emergence of the next-generation industries.



Introduction to ZENIMID™

ZENIMID™ is a brand inspired by 'Zenith' meaning 'the highest point' and our core material, Polyimide.

Performance

Zenimid™ is designed and built with the highest standards of quality. Beyond technical performance, we pursue meaningful value — delivering refined, precise results with quiet confidence. This is what 'Performance' means at Zenimid™.

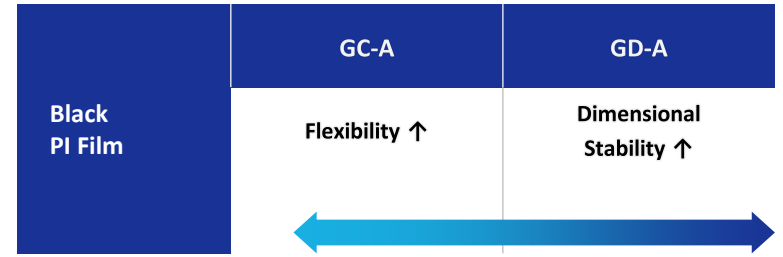
Innovation

Zenimid™ proposes new possibilities through advanced technology. We go beyond mere functional improvement to redefine experiences and bring innovation to life through sophisticated engineering. At Zenimid™, 'Innovation' is the result of forward-thinking design—crafted even in the parts you don't see.

Durability

Zenimid™ is built to perform reliably in any environment. Engineered to withstand heat, impact, and external conditions, it delivers unwavering trust even over long-term use. For Zenimid™, 'Durability' is more than just strength — it's a symbol of sustainable, dependable quality.

PI Film Line-up



Type		Thickness(μm)											Main Usage	
		4	5	7.5	9	12.5	16	25	34/ 38	50	62.5 / 68.7 5	75		100 ↑
Amber	GF	△	○	○		◎		◎		◎		◎		FCCL, CVL, Stiffener, Tape
	GV					△		◎		◎		○		Coverlay, Stiffener, Tape
	SVA												○	Synthetic G/S, Industrial
	LVD								◎	◎	◎			Synthetic G/S
Black	GDA		○	○		◎		○		○		○		Black Coverlay Black Stiffener
	GCA					○		○		△		△		
High Modulus	XT			△	△	△			△					FCCL, CVL
	FG		△	△		△	△	○	△	△				FCCL, Coverlay, Stiffener for high frequency FPCB

◎ regular production, ○ periodic production campaign, △ irregular production

※ Various thicknesses available for the customers' requirements

ZENIMID™

Amber Polyimide Film



PI Advanced Materials Co., Ltd.

Type		GF (Matching with CTE of Cu)									
	Property	Unit	GF							Test Method	
General	Nominal Thickness	μm	4	5	7.5	12.5	25	50	75		
Mechanical	Tensile Strength	MPa	MD	327	325	330	310	296	270	262	ASTM D882*
			TD	333	330	335	315	295	273	262	
	Elongation at Break	%	MD	59	62	67	75	78	74	77	
			TD	57	58	65	72	82	75	80	
	Modulus	GPa	MD	3.8	3.7	3.6	3.5	3.4	3.3	3.5	
			TD	3.8	3.7	3.6	3.5	3.4	3.3	3.4	
Thermal	Heat Shrinkage (200°C x 2hr)	%	MD	0.08	0.10	0.08	0.06	0.04	0.05	0.03	IPC TM650 2.2.4A
			TD	0.01	0.01	0.01	0.01	0.00	0.01	0.00	
	Coefficient of Thermal Expansion	ppm /°C	MD	12	12	13	14	16	18	16	TMA Method (100~200°C)
			TD	16	16	16	16	17	17	17	
Electric	Volume Resistivity	Ω·cm	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	ASTM D 257	
	Dielectric Strength	kV/mm	300	300	310	328	345	231	208	ASTM D 149	
Optical	Haze	%	2.0	2.3	2.7	3.8	7.5	13.0	18.7	ASTM D1003	

* Grip separation 50mm, Speed 200mm/min

Note1. The data provided above is not intended to be relied on by third parties for any business decision or legal determination.

Note2. Actual data may vary for a variety of reasons, including but not limited to improvements to the product and protocol used for testing the product.

PI Advanced Materials Co., Ltd.

Type		GV (Low Modulus, High Flexibility)						
	Property	Unit	GV				Test Method	
General	Nominal Thickness	μm	12.5	25	50	75		
Mechanical	Tensile Strength	MPa	MD	285	265	243	207	ASTM D882*
			TD	295	270	245	212	
	Elongation at Break	%	MD	105	115	125	113	
			TD	104	117	128	115	
	Modulus	GPa	MD	2.4	2.4	2.4	2.4	
			TD	2.4	2.4	2.4	2.4	
Thermal	Heat Shrinkage (200°C x 2hr)	%	MD	0.08	0.05	0.04	0.03	IPC TM650 2.2.4A
			TD	0.01	0.01	0.01	0.01	
	Coefficient of Thermal Expansion	ppm /°C	MD	33	33	33	33	TMA Method (100~200°C)
			TD	35	35	35	34	
Electric	Volume Resistivity	Ω·cm	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	ASTM D 257	
	Dielectric Strength	kV/mm	325	332	308	250	ASTM D 149	
Optical	Haze	%	3.5	5.7	10.0	13.5	ASTM D1003	

* Grip separation 50mm, Speed 200mm/min

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 Note2. Actual data may vary for a variety of reasons, including but not limited to improvements to the product and protocol used for testing the product.

PI Advanced Materials Co., Ltd.

Type		SVA (Ultra Thickness for Synthetic Graphite Sheet)							
Property	Unit	SVA					Test Method		
General	Nominal Thickness	μm	100	125	145	150	160		
Mechanical	Tensile Strength	MPa	MD	204	218	180	176	174	ASTM D882*
			TD	206	216	181	176	178	
	Elongation at Break	%	MD	161	130	120	138	141	
			TD	164	124	120	136	143	
	Modulus	GPa	MD	2.7	2.5	2.9	3.0	3.0	
			TD	2.6	2.5	2.9	3.0	3.0	
Thermal	Heat Shrinkage (200°C x 2hr)	%	MD	0.06	0.03	0.04	0.10	0.08	IPC TM650 2.2.4A
			TD	-0.01	-0.03	-0.03	0.01	0.01	
	Coefficient of Thermal Expansion	ppm /°C	MD	31	30	29	32	30	TMA Method (100~200°C)
			TD	30	28	28	29	29	
Electric	Volume Resistivity	Ω·cm	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	ASTM D 257	
	Dielectric Strength	kV/mm	203	182	162	151	143	ASTM D 149	
Optical	Haze	%	2.9	4.1	5.0	3.8	4.2	ASTM D1003	

* Grip separation 50mm, Speed 200mm/min

Note1. The data provided above is not intended to be relied on by third parties for any business decision or legal determination.
 Note2. Actual data may vary for a variety of reasons, including but not limited to improvements to the product and protocol used for testing the product.

PI Advanced Materials Co., Ltd.

Type	LVD (For Synthetic Graphite Sheet)							
	Property	Unit	LVD				Test Method	
General	Nominal Thickness	μm	38	50	62.5	68.75		
Mechanical	Tensile Strength	MPa	MD	200	191	195	228	ASTM D882*
			TD	203	193	198	231	
	Elongation at Break	%	MD	114	112	115	119	
			TD	116	115	116	121	
	Modulus	GPa	MD	3.1	2.7	2.8	2.5	
			TD	3.0	2.7	2.8	2.5	
Thermal	Heat Shrinkage (200°C x 2hr)	%	MD	0.09	0.04	0.06	0.00	IPC TM650 2.2.4A
			TD	0.03	-0.01	0.01	-0.01	
	Coefficient of Thermal Expansion	ppm /°C	MD	34	34	36	33	TMA Method (100~200°C)
			TD	34	35	34	33	
Electric	Volume Resistivity	Ω·cm	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶	ASTM D 257	
	Dielectric Strength	kV/mm	310	268	240	218	ASTM D 149	
Optical	Haze	%	9	11	12	14	ASTM D1003	

* Grip separation 50mm, Speed 200mm/min

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 Note2. Actual data may vary for a variety of reasons, including but not limited to improvements to the product and protocol used for testing the product.

ZENIMID™

Black Polyimide Film



PI Advanced Materials Co., Ltd.

Type		GDA (Black, Matching with CTE of Cu)								
	Property	Unit	GDA						Test Method	
General	Nominal Thickness	μm	5	7.5	12.5	25	50	75		
	Tensile Strength	MPa	MD	192	203	212	220	218	205	ASTM D882*
TD			190	205	217	223	225	208		
Mechanical	Elongation at Break	%	MD	40	48	63	70	73	63	
			TD	35	45	58	68	70	63	
	Modulus	GPa	MD	2.9	3.2	3.2	3.1	3.1	3.1	
			TD	2.9	3.2	3.2	3.1	3.1	3.1	
Thermal	Heat Shrinkage (200°C x 2hr)	%	MD	0.09	0.08	0.05	0.04	0.03	0.02	IPC TM650 2.2.4A
			TD	-0.01	0.01	0.01	0.01	0.01	0.01	
	Coefficient of Thermal Expansion	ppm /°C	MD	17	17	19	20	20	20	TMA Method (100~200°C)
			TD	19	20	20	20	20	20	
Electric	Volume Resistivity	Ω·cm	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	ASTM D 257	
	Dielectric Strength	kV/mm	67	88	122	192	160	120	ASTM D 149	
Optical	Gloss	GU	39	37	22	22	23	23	ASTM D523	
	Transmittance	%	8.5	2.3	0.0	0.0	0.0	0.0	ASTM D1003	

* Grip separation 50mm, Speed 200mm/min

Note1. The data provided above is not intended to be relied on by third parties for any business decision or legal determination.

Note2. Actual data may vary for a variety of reasons, including but not limited to improvements to the product and protocol used for testing the product.

PI Advanced Materials Co., Ltd.

Type		GCA (Black, Low Modulus)						
Property	Unit	GCA				Test Method		
General	Nominal Thickness	μm	12.5	25	50	75		
Mechanical	Tensile Strength	MPa	MD	190	192	182	180	ASTM D882*
			TD	196	197	190	185	
	Elongation at Break	%	MD	76	85	95	99	
			TD	73	82	90	94	
	Modulus	GPa	MD	2.4	2.6	2.5	2.6	
			TD	2.5	2.6	2.5	2.6	
Thermal	Heat Shrinkage (200°C x 2hr)	%	MD	0.08	0.05	0.03	0.02	IPC TM650 2.2.4A
			TD	0.01	0.01	0.01	0.01	
	Coefficient of Thermal Expansion	ppm /°C	MD	33	35	35	35	TMA Method (100~200°C)
			TD	36	36	35	35	
Electric	Volume Resistivity	Ω-cm	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	ASTM D 257	
	Dielectric Strength	kV/mm	120	180	140	112	ASTM D 149	
Optical	Gloss	GU	23	22	23	24	ASTM D523	
	Transmittance	%	0.0	0.0	0.0	0.0	ASTM D1003	

* Grip separation 50mm, Speed 200mm/min

Note1. The data provided above is not intended to be relied on by third parties for any business decision or legal determination.
 Note2. Actual data may vary for a variety of reasons, including but not limited to improvements to the product and protocol used for testing the product.

ZENIMID™

High Modulus Polyimide Film



PI Advanced Materials Co., Ltd.

Type	XT (High Modulus for FCCL, CVL)							
	Property	Unit	XT				Test Method	
General	Nominal Thickness	μm	7.5	9	12.5	18		
Mechanical	Tensile Strength	MPa	MD	300	300	300	300	ASTM D882*
			TD	300	300	300	300	
	Elongation at Break	%	MD	40	45	40	45	
			TD	40	45	40	45	
	Modulus	GPa	MD	6.5	6.5	6.0	6.0	
			TD	6.5	6.5	6.0	6.0	
Thermal	Heat Shrinkage (200°C x 2hr)	%	MD	0.05	0.04	0.04	0.04	IPC TM650 2.2.4A
			TD	0.01	0.01	0.01	0.01	
	Coefficient of Thermal Expansion	ppm /°C	MD	12	12.5	12.5	12.5	TMA Method (100~200°C)
			TD	11	11	11.5	11.5	
Electric	Volume Resistivity	Ω·cm	>1016	>1016	>1016	>1016	ASTM D 257	
	Dielectric Strength	kV/mm	400	380	380	365	ASTM D 149	
Optical	Haze	%	3.3	3.3	2.2	5.3	ASTM D1003	

* Grip separation 50mm, Speed 200mm/min

Note1. The data provided above is not intended to be relied on by third parties for any business decision or legal determination.

Note2. Actual data may vary for a variety of reasons, including but not limited to improvements to the product and protocol used for testing the product.

PI Advanced Materials Co., Ltd.

Type		FG (Low Df for High Frequency FPCB)								
Property	Unit	FG								Test Method
General	Nominal Thickness	μm	7.5	12.5	16	25	34	50		
Mechanical	Tensile Strength	MPa	MD	315	320	340	340	340	345	ASTM D882*
			TD	345	330	335	345	330	340	
	Elongation at Break	%	MD	35	45	50	55	55	50	
			TD	30	40	50	55	55	55	
	Modulus	GPa	MD	11.0	11.0	10.5	9.5	9.5	9.5	
			TD	12.0	11.0	10.5	9.5	9.5	9.5	
Thermal	Heat Shrinkage (200°C x 2hr)	%	MD	0.04	0.04	0.03	0.03	0.03	0.02	IPC TM650 2.2.4A
			TD	-0.01	-0.01	-0.01	0.01	0.01	-0.01	
	Coefficient of Thermal Expansion	ppm /°C	MD	10	10	10.5	10.5	10	8.5	TMA Method (100~200°C)
			TD	8	10.5	11.5	9.5	11.5	10.5	
Dielectric	Dk [25°C, 45%RH]	-	3.5	3.5	3.5	3.5	3.6	3.5	SPDR 10Ghz	
	Df [25°C, 45%RH]	-	0.0039	0.0035	0.0037	0.0038	0.0038	0.0037	SPDR 10Ghz	
Optical	Haze	%	4.5	9	11	16.5	22.5	26.5	ASTM D1003	

* Grip separation 50mm, Speed 200mm/min

Note1. The data provided above is not intended to be relied on by third parties for any business decision or legal determination.
 Note2. Actual data may vary for a variety of reasons, including but not limited to improvements to the product and protocol used for testing the product.

ZENIMID™

PI Varnish



VE Series

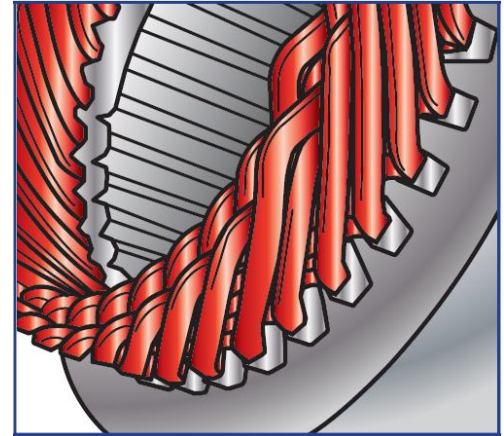
PI Varnish for EV

Signature Features

- Excellent heat stability and flexibility
- Good compatibility with Copper
- Good corona discharge resistance

Applications

- Wire for EV motors, pumps, Electrical equipment.
- Induction heating coils



Technical Properties

Properties	Unit	Mass-product			New product		
		VEH	VEC	VEA	VEP	VEB	
		General	Anti-corona	Adhesion	High Anti-corona	Self-lubricant	
Solvent		DMAc or NMP or Hydrocarbon Mixture					
Varnish	Solid contents	%	25	25	25	25	25
	Viscosity	cP	1,000 ~ 10,000				
Curing condition		110°C(20min) → 150°C(20min) → 200°C(20min) → 300°C(20min) @Air					
Film	Thickness	µm	20	20	20	20	20
	Adhesion on Cu	N/cm	3.5	3.5	5.3		
	Pulse endurance @1.5kV	min	83	207		>4,000	
	Friction Prop.	PI-PI	0.55	0.38			0.30
	Thermal conductivity	W/mK	0.28	0.26	0.23		0.47
	Tg	°C	413	389	414	401	397
	Td 5%	°C	558	544	556	573	582
	Elongation	%	80	69	63	61	47
Tensile strength	Mpa	210	183	200	159	125	

VD Series

PI Varnish for Flexible Device substrate

Signature Features

- Superior dimensional stability
- Ultra-High thermal resistance
- High mechanical strength
- NMP-free Solvent



Applications

- TFT substrate for flexible OLED display
- Substrate for flexible devices
- Ultra-high thermal resistance dielectrics

Technical Properties

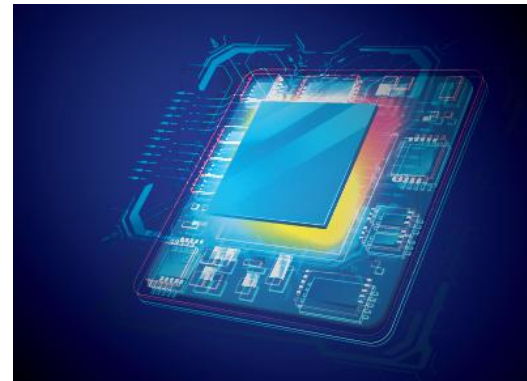
	Properties	Units	VDE
Varnish	Solvent		NMP-free
	Solid Content	%	10~20
	Viscosity	cP	2,000~5,000
	Hard-baking Temperature	°C	470
Film	Thickness	μm	9.9
Optical	Transmittance	%	68
Mechanical	Tensile strength	MPa	450
	Modulus	GPa	7
	Elongation	%	40
Thermal	Decomposition Temp. 1%	°C	574
	Glass transition Temp.	°C	>470
	Coefficient of Thermal Expansion (@100-470°C)	ppm/°C	4

VS Series

PI Varnish for Semiconductor (Non-Photosensitive)

Signature Features

- Excellent dimensional stability
- Excellent dielectric properties
- Adhesion on various substrates
- Compatible with CMOS, MEMS process



Applications

- Passivation, Buffer layer
- Sacrificial layer in MEMS process
- Active layer in humidity sensors

Technical Properties

Item	Properties	Unit	VSS	VSF
Varnish	Solid content	%	10~20	
	Solvent	-	NMP	NMP
	Viscosity	cP	2,000	7,000
Hard-bake Temp.		°C	350	350
Film	Thickness	μm	10	10
	Tensile strength	MPa	380	131
	Elongation	%	17	20
	Modulus	GPa	8.7	2.3
	Tg	°C	400	302
	CTE	ppm/°C	5	70
	Td (1%)	°C	541	514
	Dielectric constant(@10GHz)			3.5

ZENIMID™

PI Mold



M Series

PI Plate

Signature Features

- Remarkable Thermal Property - Continuous Usage Temperature 300°C, Temporary 500°C
- Dimension Stability, Friction & Chemical Resistance

Applications

- Roller, Guide Pin
- Vacuum Pad, etc.

Technical Properties

Normal Grade



PROPERTY	UNIT	PIAM MP Type	Company A	Company B
Tensile Strength	MPa	119	107	110
Elongation	%	13	15	13
Modulus	GPa	2.0	2.0	2.1
Specific Gravity	-	1.43	1.43	1.43
Hardness	Rockwell 'E'	30~40	35	46

ESD Grade



PROPERTY	UNIT	PIAM ME Type	Company B	TEST METHOD
Tensile Strength	MPa	112.6	111.1	ASTM D-1708
Modulus	GPa	2.03	1.97	ASTM D-1708
Elongation	%	12.9	12.5	ASTM D-1708
Specific Gravity	-	1.44	1.45	ASTM D-792
Size	mm	318*318*65T	304*304*51T	
Surface Resistivity	Ω	10 ⁶ ~9	10 ⁶ ~9	STM11.13 @100V

ZENIMID™