

# ThinFlex-A Adhesiveless Double Sided Copper Clad Laminate (Halogen Free)

ThinFlex-A is an adhesiveless double sided (D/S) metal clad polyimide film, furnished in the form of roll laminate with RA or ED copper on both sides. ThinFlex-A adhesiveless D/S composites are designed for a wide variety of flexible circuit applications which require advanced material performance, temperature resistance, fine pitch, and high reliability.

# 1. Product Characteristics:

- \* Excellent dimensional stability
- \* Excellent flexibility
- \* Finer line etch ability
- \* Low moisture absorption
- \* Excellent flammability (Flame class UL 94V-0; UL File No. E219724)
- \* Excellent chemical resistance
- \* Excellent thermal, mechanical, and electrical properties

# 2. Specifications:



### \*Other thicknesses and dimensions are available on customers' demand.





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## 3. Construction:

Copper foil

Polyimide film

Copper foil

# 4. Properties:

	Test item		Units	A-1003RD A-1005RD	A-1002ED A-1003ED A-1010ED	A-1005ED A-1010RD	Test Method
		As Received		≧ 0.80	≧ 1.00	≧ 1.20	
		Solder Float		≧ 0.80	≧ 1.00	≧ 1.20	IPC-TM650
Mechanical	Peel Strength	After Temp. Cycling	Kgf/cm	≧ 0.80	≧ 1.00	≧ <b>1.20</b>	2.4.9
Properties		Chemical Resistance		≧ 0.80	≧ 1.00	≧ 1.20	IPC-TM650 2.3.2
	Flexural	M.D.	Times	≧300	≧300	≧300	JIS-C 6471 0.8mmR,
	Endurance	T.D.		≧300	≧300	≧300	0.5kg
	Surface R	esistance	Ω	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	IPC-TM650
Electrical Properties	Volume Resistance		$\Omega$ -cm	$\geq$ 1.0×10 <sup>12</sup>	$\ge 1.0 \times 10^{12}$	$\geq$ 1.0×10 <sup>12</sup>	2.5.17
	Insulation I	Resistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensional	M.D.	0/	04.04	04.04	04.04	IPC-TM650
	Stability	T.D.	%	-0.1~0.1	-0.1~0.1	-0.1~0.1	2.2.4C
Physical and	Solder 10sec at 28	r Float 8℃(550⁰F)		Pass	Pass	Pass	IPC-TM650 2.4.13
Thermal Properties	Thickness	Tolerance	%	±10%	±10%	±10%	ThinFlex
	lon Mig (1000hr/85%/	gration 85℃/50VDC)		Pass	Pass	Pass	
	UL Flam	ne Class		94V-0	94V-0	94V-0	UL





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	Test item		Units	A-2002ED A-2003RD A-2005RD	A-2010RD A-2010ED	Test Method
		As Received		≧ 0.80	≧ 1.00	
		Solder Float		≧ 0.80	≧ 1.00	IPC-TM650
Mechanical	Peel Strength	After Temp. Cycling	Kgf/cm	≧ 0.80	≧ 1.00	2.4.9
Properties		Chemical Resistance		≧ 0.80	≧ 1.00	IPC-TM650 2.3.2
	Flexural	M.D.	Times	N/A	N/A	JIS-C 6471 0.8mmR,
	Endurance	T.D.		N/A	N/A	0.5kg
	Surface R	esistance	Ω	$\ge 1.0 \times 10^{11}$	$\ge 1.0 \times 10^{11}$	IPC-TM650
Electrical Properties	Volume R	esistance	$\Omega$ -cm	$\ge 1.0 \times 10^{12}$	$\ge 1.0 \times 10^{12}$	2.5.17
	Insulation I	Resistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensional	M.D.				IPC-TM650
	Stability	T.D.	%	-0.1~0.1	-0.1~0.1	2.2.4C
Physical and		r Float 88℃ (550⁰F)		Pass	Pass	IPC-TM650 2.4.13
Thermal Properties	Thickness	Tolerance	%	±10%	±10%	ThinFlex
		gration 85℃/50VDC)		Pass	Pass	
	UL Flam	ne Class		94V-0	94V-0	UL



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	Test item	l	Units	A-2003ED A-2005ED	A-2020RD A-2020ED	Test Method
		As Received		≧ 1.20	≧ 2.00	
		Solder Float	Í	≧ 1.20	≧ 2.00	IPC-TM650
Mechanical	Peel Strength	After Temp. Cycling	Kgf/c m	≧ 1.20	≧ 2.00	2.4.9
Properties		Chemical Resistance		≧ 1.20	<b>≧ 2.00</b>	IPC-TM650 2.3.2
	Flexural	M.D.	Times	N/A	N/A	JIS-C 6471 0.8mmR,
	Endurance	T.D.		N/A	N/A	0.5kg
	Surfac	e Resistance	Ω	$\geq 1.0 \times 10^{1}$	$\geq 1.0 \times 10^{1}$	IPC-TM650
Electrical Properties	Volum	e Resistance	Ω-cm	$\geq 1.0 \times 10^{1}$	$\geq 1.0 \times 10^{1}$	2.5.17
	Insulati	on Resistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensional	M.D.				IPC-TM650
	Stability	T.D.	%	-0.1~0.1	-0.1~0.1	2.2.4C
Physical and		lder Float t 288℃(550ºF)		Pass	Pass	IPC-TM650 2.4.13
Thermal Properties	Thickne	ess Tolerance	%	±10%	±10%	ThinFlex
		Migration 5%/85℃/50VDC)		Pass	Pass	
	UL F	lame Class		94V-0	94V-0	UL



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### 5. Storage:

ThinFlex-A will meet its shelf-life for at least 12 months after arrival at the user's factory when stored in the original packaging at temperatures of below 25°C and below 70% humidity. The products do not need refrigeration and should not be frozen.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

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# ThinFlex-G Adhesiveless Double Sided Copper Clad Laminate (Halogen Free)

ThinFlex-G is an adhesiveless double sided (D/S) metal clad polyimide film, furnished in the form of roll laminate with RA or ED copper on both side. ThinFlex-G adhesiveless D/S composites are designed for a wide variety of flexible circuit applications which requires advanced material performance, temperature resistance, fine pitch, and high reliability.

# 1. Product Characteristics:

- \* Excellent dimensional stability
- \* Excellent flexibility
- \* Finer line etch ability
- \* Low moisture absorption
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Excellent thermal, mechanical, and electrical properties

# 2. Specifications:



### \*Other thicknesses and dimensions are available on customers' demand.



3. Constructions:

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Copper foil

Polyimide film

Copper foil

# 4. Properties:

	Test item		Unit	G-1005RD G-1003RD G-1002ED	G-1010RD G-1010ED G-1003ED	G-1005ED	Test Method	
		As Received		≧0.80	≧1.00	≧1.20		
		Solder Float		≧0.80	≧1.00	≧1.20	IPC-TM650 2.4.9	
Mechanical	Peel Strength	After temp. cycling	Kgf/cm	≧0.80	≧1.00	≧1.20		
Properties		Chemical Resistance		≧0.80	≧1.00	≧1.20	IPC-TM650 2.3.2	
	Flexural	M.D.	Timos	≧300	≧300	≧300	JIS-C 6471	
	Endurance		Times	≧300	≧300	≧300	0.8mmR, 0.5kg	
	Surface Re	esistance	Ω	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	IPC-TM650	
Electrical Properties	Volume Re	Ω-cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq\!1.0 {\rm x} 10^{12}$	$\geq$ 1.0x10 <sup>12</sup>	2.5.17		
	Insulation F	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2		
	Dimensional	M.D.	%	-0.1~0.1	-0.1~0.1	-0.1~0.1	IPC-TM650	
	Stability	T.D.	70	0.0~0.15	0.0~0.15	0.0~0.15	2.2.4C	
Physical and	Solder 10sec at 28			Pass	Pass	Pass	IPC-TM650 2.4.13	
Thermal Properties	Thickness	Tolerance	%	±10%	±10%	±10%	ThinFlex	
Topenies	lon Mig (1000hr/85%/8			Pass	Pass	Pass		
	UL Flam	ne Test		94V-0	94V-0	94V-0	UL	



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### 5. Storage:

ThinFlex-G will meet its shelf-life for at least 12 months after arrival at the user's factory when stored in the original packaging at temperatures of below 25°C and below 70% humidity. The products do not need refrigeration and should not be frozen.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

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# ThinFlex-G6 Adhesiveless Double Sided Copper Clad Laminate (Halogen Free)

ThinFlex-G6 is an adhesiveless double sided (D/S) metal clad polyimide film, furnished in the form of roll laminate with RA or ED copper on both side. ThinFlex-G adhesiveless D/S composites are designed for a wide variety of flexible circuit applications which requires advanced material performance, temperature resistance, fine pitch, and high reliability.

# 1. Product Characteristics:

- \* Excellent dimensional stability
- \* Excellent flexibility
- \* Finer line etch ability
- \* Low moisture absorption
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Excellent thermal, mechanical, and electrical properties

# 2. Specifications:



### \*Other thicknesses and dimensions are available on customers' demand.



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### 3. Constructions:

Copper foil

Polyimide film

Copper foil

### 4. Properties:

	Test item		Unit	G6-0610ED G6-0602ED	G6-0605RD G6-0603ED	Test Method
		As Received		≧ 0.54	≧ 0.60	
		Solder Float		≧ 0.54	≧ 0.60	IPC-TM650
	Peel Strength	After temp. cycling	Kgf/cm	≧ 0.54	≧ 0.60	2.4.9
		Chemical Resistance		≧ 0.54	≧ 0.60	IPC-TM650 2.3.2
	Flexural	M.D.	Times	≧300	≧300	JIS-C 6471
	Endurance	T.D.	Times	≧300	≧300	0.8mmR, 0.5kg
	Surface R	esistance	Ω	$\ge 1.0 \times 10^{11}$	$\ge 1.0 \times 10^{11}$	IPC-TM650
Electrical Properties	Volume R	esistance	$\Omega$ -cm	$\ge 1.0 \times 10^{12}$	$\geq$ 1.0 $\times$ 10 <sup>12</sup>	2.5.17
	Insulation I	Resistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensional	M.D.	%	-0.1~0.1	-0.1~0.1	IPC-TM650
	Stability	T.D.	70	0.0~0.15	0.0~0.15	2.2.4C
Physical and	Solder 10sec at 28			Pass	Pass	IPC-TM650 2.4.13
Thermal Properties	Thickness	Tolerance	%	±10%	±10%	ThinFlex
Froperties -	lon Mig (1000hr/85%)			Pass	Pass	
	UL Flar	ne Test		Applying	Applying	UL



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### 5. Storage:

ThinFlex-G6 will meet its shelf-life for at least 12 months after arrival at the user's factory when stored in the original packaging at temperatures of below 25°C and below 70% humidity. The products do not need refrigeration and should not be frozen.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

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Thin Flex

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# ThinFlex-H Adhesiveless Copper Clad Laminate (Halogen Free)

ThinFlex-H is an adhesiveless metal clad polyimide film, furnished in the form of roll laminate with RA or ED copper on one side. ThinFlex-H adhesiveless composites are designed for a wide variety of flexible circuit applications which require advanced material performance, temperature resistance, fine pitch, and high reliability.

# 1. Product Characteristics:

- \* Excellent dimensional stability
- \* Excellent flexibility
- \* Finer line etch ability
- \* Low moisture absorption
- \* Excellent flammability (Flame class UL 94V-0; UL File No. E219724)
- \* Excellent chemical resistance
- \* Excellent thermal, mechanical, and electrical properties

# 2. Specifications:



### \*Other thicknesses and dimensions are available on customers' demand.



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# 3. Construction:

Copper foil

Polyimide film

## 4. Properties:

	Test item			Unit	H-1005RS	H-1005ES	H-1010RS H-0510RS	Test Method
		As	Received		≧0.90	≧1.00	≧1.07	
		Sc	older Float		≧0.90	≧1.00	≧1.07	IPC-TM650
	Peel Strength		ter Temp. Cycling	Kgf/cm	≧0.90	≧1.00	≧1.07	2.4.9
		-	Chemical esistance		≧0.90	≧1.00	≧1.07	IPC-TM650 2.3.2
	Tensile stre	ength (l	oase film)	kg/mm <sup>2</sup>	20	20	20	IPC-TM-650
Mechanical	Elongati	on (bas	se film)	%	20	20	20	Method 2.4.19
Properties	Tensile Mo	dulus (l	base film)	kg/mm <sup>2</sup>	720	720	720	ASTM D882
	Initial T (b	ear Str ase film		g	1500	1500	1500	IPC-TM-650 Method 2.4.16
	Propagation Tear Strength (base film)			g	15	15	15	IPC-TM-650 Method 2.4.17.1
	Flexural		M.D.		≧500	≧500	≧300	JIS-C 6471
	Enduranc	e	T.D.	Times	≧500	≧500	≧300	0.8mmR, 0.5kg
	Surface	e Resis	tance	Ω	$\ge 1.0 \times 10^{11}$	$\ge 1.0 \times 10^{11}$	$\geq$ 1.0×10 <sup>11</sup>	IPC-TM650
Electrical	Volume	e Resis	tance	Ω-cm	$\ge 1.0 \times 10^{12}$	$\ge 1.0 \times 10^{12}$	$\ge 1.0 \times 10^{12}$	2.5.17
Properties	Insulatio	on Resi	stance	Ω	$\geq$ 1.0×10 <sup>9</sup>	$\geq$ 1.0×10 <sup>9</sup>	$\geq$ 1.0×10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dielectric St	rength	(base film)	KV/mil	6.0	6.0	6.0	ASTM-D-149
	Dimension	al	M.D.	%	01.01	01.01	01.01	IPC-TM650
	Stability		T.D.	70	-0.1~0.1	-0.1~0.1	-0.1~0.1	2.2.4C
Physical and Thermal		Solder Float 10sec at 288℃ (550⁰F)			Pass	Pass	Pass	IPC-TM650 2.4.13
Properties	Thickr	ness of	total	um	43±10%	43±10%	60±10% 48±10%	ThinFlex
	UL FI	lame Cl	ass		94V-0	94V-0	94V-0	UL

\* Above data are typical values, and are not guaranteed values.

Technical Data Sheet: H-Rev.1, May/2006



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	Test iten	n	Unit	H-1010ES	H-0505RS	H-0505ES	Test Method
		As Received		≧1.20	≧0.70	≧0.60	
		Solder Float	]	≧1.20	≧0.70	≧0.60	IPC-TM650
	Peel Strength	After Temp. Cycling	Kgf/cm	≧1.20	≧0.70	≧0.60	2.4.9
		Chemical Resistance		≧1.20	≧0.70	≧0.60	IPC-TM650 2.3.2
	Tensile st	rength (base film)	kg/mm <sup>2</sup>	20	18.5	18.5	IPC-TM-650
Mechanical	Elongat	ion (base film)	%	20	13	13	Method 2.4.19
Properties	Tensile Mo	odulus (base film)	kg/mm <sup>2</sup>	720	770	770	ASTM D882
		Tear Strength base film)	g	1500	720	720	IPC-TM-650 Method 2.4.16
		on Tear Strength ase film)	g	15	5	5	IPC-TM-650 Method 2.4.17.1
	Flexural Endurance	M.D.		≧300	≧800	≧800	JIS-C 6471
		T.D.	T.D.		≧800	≧800	0.8mmR, 0.5kg
	Surfac	e Resistance	Ω	$\geq$ 1.0×10 <sup>11</sup>	$\geq$ 1.0×10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	IPC-TM650
Electrical	Volum	e Resistance	Ω-cm	$\geq$ 1.0 $\times$ 10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
Properties	Insulati	on Resistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	≧1.0×10 <sup>9</sup>	$\ge$ 1.0×10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dielectric S	trength (base film)	KV/mil	6.0	5.0	5.0	ASTM-D-149
	Dimensional	M.D.		04.04	04.04	04.04	IPC-TM650
Dhusiasi	Stability	T.D.	%	-0.1~0.1	-0.1~0.1	-0.1~0.1	2.2.4C
Physical and Thermal		Solder Float 10sec at 288℃(550⁰F)		Pass	Pass	Pass	IPC-TM650 2.4.13
Properties	Thick	ness of total	um	60±10%	31±10%	31±10%	ThinFlex
	UL F	lame Class		94V-0	94V-0	94V-0	UL



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	Test item	1	Unit	H-0805RS	H-0805ES	H-1003RS	Test Method
		As Received		≧0.90	≧0.80	≧0.80	
		Solder Float		≧0.90	≧0.80	≧0.80	IPC-TM650
	Peel Strength	After Temp. Cycling	Kgf/cm	≧0.90	≧0.80	≧0.80	2.4.9
		Chemical Resistance		≧0.90	≧0.80	≧0.80	IPC-TM650 2.3.2
	Tensile str	ength (base film)	kg/mm <sup>2</sup>	20	20	20	IPC-TM-650
Mechanical	Elongat	ion (base film)	%	20	20	20	Method 2.4.19
Properties	Tensile Mo	odulus (base film)	kg/mm <sup>2</sup>	730	730	720	ASTM D882
		Fear Strength base film)	g	1400	1400	1500	IPC-TM-650 Method 2.4.16
		on Tear Strength ase film)	g	10	10	15	IPC-TM-650 Method 2.4.17.1
	Flexural Endurance	M.D.		≧600	≧600	≧500	JIS-C 6471
		T.D.	T.D.		≧600	≧500	0.8mmR, 0.5kg
	Surfac	e Resistance	Ω	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	IPC-TM650
Electrical	Volum	e Resistance	$\Omega$ -cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	$\geq\!1.0 {\rm x} 10^{12}$	2.5.17
Properties	Insulati	on Resistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dielectric S	trength (base film)	KV/mil	6.0	6.0	6.0	ASTM-D-149
	Dimensional Stability	M.D. T.D.	%	-0.1~0.1	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
Physical and Thermal		Solder Float 10sec at 288℃(550⁰F)		Pass	Pass	Pass	IPC-TM650 2.4.13
Properties	Thick	ness of total	um	38±10%	38±10%	38 ±10%	ThinFlex
	UL F	lame Class		94V-0	94V-0	94V-0	UL



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	Test iten	1	Unit	H-1003ES	H-0803RS	H-0803ES	Test Method
		As Received		≧0.90	≧0.60	≧0.70	
		Solder Float		≧0.90	≧0.60	≧0.70	IPC-TM650
	Peel Strength	After Temp. Cycling	Kgf/cm	≧0.90	≧0.60	≧0.70	2.4.9
		Chemical Resistance		≧0.90	≧0.60	≧0.70	IPC-TM650 2.3.2
	Tensile str	ength (base film)	kg/mm <sup>2</sup>	20	20	20	IPC-TM-650
Mechanical	Elongat	ion (base film)	%	20	20	20	Method 2.4.19
Properties	Tensile Mo	odulus (base film)	kg/mm <sup>2</sup>	720	730	730	ASTM D882
		Fear Strength base film)	g	1500	1400	1400	IPC-TM-650 Method 2.4.16
		on Tear Strength ase film)	g	15	10	10	IPC-TM-650 Method 2.4.17.1
	Flexural Endurance	M.D.		≧500	≧800	≧800	JIS-C 6471
		T.D.	Times	≧500	≧800	≧800	0.8mmR, 0.5kg
	Surfac	e Resistance	Ω	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	IPC-TM650
Electrical	Volum	e Resistance	Ω-cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	$\geq\!1.0x10^{12}$	2.5.17
Properties	Insulati	on Resistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dielectric S	trength (base film)	KV/mil	6.0	6.0	6.0	ASTM-D-149
	Dimensional Stability	M.D. T.D.	%	-0.1~0.1	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
Physical and Thermal		Solder Float 10sec at 288°∁(550⁰F)		Pass	Pass	Pass	IPC-TM650 2.4.13
Properties	Thick	ness of total	um	38 ±10%	33±10%	33±10%	ThinFlex
	UL F	lame Class		94V-0	94V-0	94V-0	UL



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	Test item		Unit	H-0503RS	H-0503ES	Test Method
		As Received		≧0.60	≧0.70	
		Solder Float		≧0.60	≧0.70	IPC-TM650
	Peel Strength	After Temp. Cycling	Kgf/cm	≧0.60	≧0.70	2.4.9
		Chemical Resistance		≧0.60	≧0.70	IPC-TM650 2.3.2
	Tensile str	ength (base film)	kg/mm <sup>2</sup>	18.5	18.5	IPC-TM-650
Mechanical	Elongati	on (base film)	%	13	13	Method 2.4.19
Properties	Tensile Mo	dulus (base film)	kg/mm <sup>2</sup>	770	770	ASTM D882
		ear Strength ase film)	g	720	720	IPC-TM-650 Method 2.4.16
		on Tear Strength ase film)	g	5	5	IPC-TM-650 Method 2.4.17.1
	Flexural	M.D.		≧1200	≧1200	JIS-C 6471
	Endurance	T.D.	Times	≧1200	≧1200	0.8mmR, 0.5kg
	Surface	e Resistance	Ω	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	IPC-TM650
Electrical	Volume	e Resistance	$\Omega$ -cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
Properties	Insulatio	on Resistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	≧1.0x10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dielectric St	rength (base film)	KV/mil	5.0	5.0	ASTM-D-149
	Dimensional	M.D.	%	-0.1~0.1	-0.1~0.1	IPC-TM650
Dhusiaal	Stability	T.D.	70	-0.1/-0.1	-0.1/-0.1	2.2.4C
Physical and Thermal		der Float 288℃(550⁰F)		Pass	Pass	IPC-TM650 2.4.13
Properties	Thick	ness of total	um	26±10%	26±10%	ThinFlex
	UL F	lame Class		94V-0	94V-0	UL



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### 5. Storage:

ThinFlex-H will meet its shelf-life for at least 12 months after arrival at the user's factory when stored in the original packaging at temperatures of below 25°C and below 70% humidity. The products do not need refrigeration and should not be frozen.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

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# ThinFlex-X Adhesiveless Copper Clad Laminate (Halogen Free)

ThinFlex-X is an adhesiveless metal clad polyimide film, furnished in the form of roll laminate with RA or ED copper on one side. ThinFlex-X adhesiveless composites are designed for a wide variety of flexible circuit applications which require advanced material performance, temperature resistance, fine pitch, and high reliability.

# 1. Product Characteristics:

- \* Excellent dimensional stability
- \* Excellent flexibility
- \* Finer line etch ability
- \* Low moisture absorption
- \* Excellent flammability (Flame class UL 94V-0; UL File No. E219724)
- \* Excellent chemical resistance
- \* Excellent thermal, mechanical, and electrical properties

# 2. Specifications:



### \*Other thicknesses and dimensions are available on customers' demand.



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# 3. Construction:

Copper foil

Polyimide film

# 4. Properties:

	Test iten	ı		Unit	X-0505RS X-0505ES	X-0805RS X-0805ES	X-1005RS X-1005ES	Test Method
		As F	Received		≧0.60	≧0.80	≧0.60	
		Sol	der Float		≧0.60	≧0.80	≧0.60	IPC-TM650
	Peel Strength		er Temp. Sycling	Kgf/cm	≧0.60	≧0.80	≧0.60	2.4.9
			nemical sistance		≧0.60	≧0.80	≧0.60	IPC-TM650 2.3.2
	Tensile sti	rength (	base film)	kg/mm <sup>2</sup>	30	30	32	IPC-TM-650
Mechanical	Elongat	tion (ba	se film)	%	32	35	40	Method 2.4.19
Properties	Tensile Mo	odulus (	base film)	kg/mm <sup>2</sup>	650	600	580	ASTM D882
		Initial Tear Strength (base film)			1100	1500	2200	IPC-TM-650 Method 2.4.16
	Propagation Tear Strength (base film)			g	5	10	15	IPC-TM-650 Method 2.4.17.1
	Flexural		M.D.	+:	≧900	≧700	≧600	JIS-C 6471
	Endurance	e 🗌	T.D.	Times	≧900	≧700	≧600	0.8mmR, 0.5kg
	Surfac	e Resis	tance	Ω	$\ge 1.0 \times 10^{11}$	$\ge 1.0 \times 10^{11}$	$\ge 1.0 \times 10^{11}$	IPC-TM650
Electrical	Volum	e Resis	tance	$\Omega$ -cm	$\ge 1.0 \times 10^{12}$	$\ge 1.0 \times 10^{12}$	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
Properties	Insulati	on Resi	stance	Ω	$\geq$ 1.0 $\times$ 10 <sup>9</sup>	$\geq$ 1.0 $\times$ 10 <sup>9</sup>	$\geq$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dielectric S	Strength	(base film)	KV/mil	5.0	6.0	6.0	ASTM-D-149
	Dimensio	onal	M.D.	%	-0.1~0.1	-0.1~0.1	-0.1~ 0.1	IPC-TM650
Physical	Stabilit	у	T.D.	70	-0.1~0.1	-0.1~0.1	-0.1~ 0.1	2.2.4C
and Thermal	Sc 10sec a	lder Flo t 288℃			Pass	Pass	Pass	IPC-TM650 2.4.13
Properties	Thick	ness of	total	um	31±10%	38±10%	43±10%	ThinFlex
	UL F	lame C	lass		94V-0	94V-0	94V-0	UL



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	Test item			Unit	X-0503RS	X-0503ES	Test Method
		As F	Received		≧0.60	≧0.60	
		Sol	der Float		≧0.60	≧0.60	IPC-TM650
	Peel Strength		er Temp. Sycling	Kgf/cm	≧0.60	≧0.60	2.4.9
		Chem Resist			≧0.60	≧0.60	IPC-TM650 2.3.2
	Tensile stre	ength (b	oase film)	kg/mm <sup>2</sup>	30	30	IPC-TM-650
Mechanical	Elongati	on (bas	e film)	%	32	32	Method 2.4.19
Properties	Tensile Mo	dulus (t	oase film)	kg/mm <sup>2</sup>	650	650	ASTM D882
		ear Strease film		g	1100	1100	IPC-TM-650 Method 2.4.16
	Propagation Tear Strength (base film)			g	5	5	IPC-TM-650 Method 2.4.17.1
	Flexural	Flexural M.		<b>T</b>	≧1300	≧1300	JIS-C 6471
	Endurance	•	T.D.	Times	≧1300	≧1300	0.8mmR, 0.5kg
	Surface	e Resist	ance	Ω	$\geq$ 1.0x10 <sup>11</sup>	$\ge 1.0 \times 10^{11}$	IPC-TM650
Electrical	Volume	e Resist	ance	Ω-cm	$\ge$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
Properties	Insulatio	on Resis	stance	Ω	$\ge$ 1.0×10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dielectric St	rength (	(base film)	KV/mil	5.0	5.0	ASTM-D-149
	Dimensio Stability		M.D. T.D.	%	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
Physical and Thermal		Solder Float 10sec at 288℃(550⁰F)			Pass	Pass	IPC-TM650 2.4.13
Properties	Thickr	ness of	total	um	26±10%	26±10%	ThinFlex
	UL FI	ame Cl	ass		94V-0	94V-0	UL



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	Test item			Unit	X-0803RS	X-0803ES	Test Method
		As F	Received		≧0.60	≧0.80	
		Sol	der Float		≧0.60	≧0.80	IPC-TM650
	Peel Strength		er Temp. Sycling	Kgf/cm	≧0.60	≧0.80	2.4.9
		Chem Resist			≧0.60	≧0.80	IPC-TM650 2.3.2
	Tensile stre	ength (b	oase film)	kg/mm²	30	30	IPC-TM-650
Mechanical	Elongati	on (bas	e film)	%	35	35	Method 2.4.19
Properties	Tensile Mo	dulus (t	oase film)	kg/mm <sup>2</sup>	600	600	ASTM D882
		ear Strease film		g	1500	1500	IPC-TM-650 Method 2.4.16
	Propagation Tear Strength (base film)			g	10	10	IPC-TM-650 Method 2.4.17.1
	Flexural M.D.		M.D.	<b>T</b>	≧900	≧900	JIS-C 6471
	Endurance	•	T.D.	Times	≧900	≧900	0.8mmR, 0.5kg
	Surface	e Resist	ance	Ω	$\geq$ 1.0x10 <sup>11</sup>	$\ge 1.0 \times 10^{11}$	IPC-TM650
Fleetrical	Volume	e Resist	ance	$\Omega$ -cm	$\ge$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
Electrical Properties	Insulatio	on Resis	stance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dielectric St	rength (	(base film)	KV/mil	6.0	6.0	ASTM-D-149
	Dimensio Stability		M.D. T.D.	%	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
Physical and Thermal	Sol 10sec at	der Floa ∶288℃(			Pass	Pass	IPC-TM650 2.4.13
Properties	Thickr	ness of	total	um	33±10%	33±10%	ThinFlex
	UL FI	lame Cl	ass		94V-0	94V-0	UL



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### 5. Storage:

ThinFlex-X will meet its shelf-life for at least 12 months after arrival at the user's factory when stored in the original packaging at temperatures of below 25°C and below 70% humidity. The products do not need refrigeration and should not be frozen.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

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# ThinFlex-P Adhesiveless Double Sided LCP Copper Clad Laminate (Halogen Free)

ThinFlex-P is an adhesiveless double sided (D/S) metal clad liquid crystalline polymer (LCP) film, furnished in the form of roll laminate with ED copper on both side. ThinFlex-P adhesiveless D/S composites are designed for a wide variety of flexible circuit applications which requires advanced material performance, temperature resistance, fine pitch, and high reliability.

# 1. Product Characteristics:

- \* Excellent dimensional stability
- \* Excellent flexibility
- \* Finer line etch ability
- \* Very low moisture absorption
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Excellent thermal, mechanical and electrical properties at high frequency (> 5 GHz)

# 2. Specifications:



### \*Other thicknesses and dimensions are available on customers' demand.



3. Constructions:

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Copper foil LCP film Copper foil

## 4. Properties:

Properties:							
	Test item		Unit	P-1005ED	Test Method		
		As Received		≧ 0.80			
		Solder Float				≧ 0.80	IPC-TM650 2.4.9
Mechanical	Peel Strength	After temp. cycling	Kgf/cm	<b>≧ 0.80</b>	2.4.9		
Properties		Chemical Resistance		<b>≧ 0.80</b>	IPC-TM650 2.3.2		
	Flexural	M.D.	Times	≧300	JIS-C 6471		
	Endurance	T.D.	Times	≧300	0.8mmR, 0.5kg		
	Surface R	esistance	Ω	$\ge 1.0 \times 10^{11}$	IPC-TM650		
Electrical Properties	Volume R	esistance	$\Omega$ -cm	$\ge 1.0 \times 10^{12}$	2.5.17		
	Insulation I	Resistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2		
	Dimensional	M.D.	%	-0.1~0.1	IPC-TM650		
	Stability T.D.		%	-0.1~0.1	2.2.4C		
Physical and	Solder 10sec at 28	r Float 8℃(550⁰F)		Pass	IPC-TM650 2.4.13		
Thermal Properties	Thickness	Tolerance	%	±20%	ThinFlex		
	lon Mig (1000hr/85%/	gration 85℃/50VDC)		Pass			
	UL Flar	ne Test		Applying	UL		



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### 5. Storage:

ThinFlex-P will meet its shelf-life for at least 12 months after arrival at the user's factory when stored in the original packaging at temperatures of below 25°C and below 70% humidity. The products do not need refrigeration and should not be frozen.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

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# ThinFlex-J Copper Clad Laminate

ThinFlex-J is an metal clad polyimide film, furnished in the form of roll laminate with epoxy adhesive and copper cladding on one or both sides. ThinFlex-J can be used in the fabrication of flexible composites and flexible printed circuits (FPC). All copper clad laminates are available in roll form, and copper choices as RA, ED or HTE type.

### 1. Product Characteristics:

- \* Excellent heat resistance
- \* Excellent flammability (Flame class UL 94V-0; UL File No. E219724)
- \* Excellent chemical resistance
- \* Good dimensional stability
- \* Good flexibility
- \* Excellent thermal, mechanical and electrical properties

# 2. Specifications:



### \*Other thicknesses and dimensions are available on customers' demand.



ThinFlex

# **3.** Constructions:

Single-Side

Copper foil Epoxy Adhesive

Polyimide film

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### **Double-Side**

Copper foil

Epoxy Adhesive

Polyimide film

Epoxy Adhesive

Copper foil

# 4. Properties:

	Test item		Unit	J-0505RS J-0505RD	J-1005RS J-1005RD	J-1010RD	Test Method
		As Received		≧0.72	≧0.72	≧1.43	
	Peel	Solder Float	Kaf/am	≧0.62	≧0.62	≧1.25	IPC-TM650 2.4.9
Mechanical Properties	Strength	After Temp. Cycling	Kgf/cm	≧0.72	≧0.72	≧1.43	
		Chemical Resistance		≧0.58	≧0.58	≧1.14	IPC-TM650 2.3.2
	Flexural	M.D.	Times	≥250	≧150	≥150	JIS-C 6471
	Endurance	T.D.			≧75		0.8mmR, 0.5kg
	Surface Resistance		Ω	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	IPC-TM650
Electrical Properties	Volume Resistance		$\Omega$ -cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
	Insulation F	Resistance	Ω	$\ge$ 1.0×10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0×10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensional Stability	M.D. T.D.	%	-0.2~0.2	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
Physical and	Solder Float 10sec at 288℃ (550⁰F)			Pass	Pass	Pass	IPC-TM650 2.4.13
Thermal Properties	Thicknes	Thickness of total		44±10% 75±10%	58±10% 91±10%	135±10%	ThinFlex
	UL Flam	e Class		94V-0	94V-0	94V-0	UL



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	Test item			Unit	J-2005RS J-2005RD	J-2010RS J-2010RD	Test Method
		As Re	eceived		≧0.72	≧1.43	
		Sold	er Float		≧0.62	≧1.25	IPC-TM650 2.4.9
Mechanical	Peel Strength		Temp. cling	Kgf/cm	f/cm ≧0.72	≧1.43	2.4.5
Properties			emical stance		≧0.58	≧1.14	IPC-TM650 2.3.2
	Flexural	N	I.D.	Times	N/A	N/A	JIS-C 6471
	Endurance	Т	.D.				0.8mmR, 0.5kg
<b>E</b> lectricit	Surface Resistance		Ω	$\ge 1.0 \times 10^{11}$	$\ge 1.0 \times 10^{11}$	IPC-TM650	
Electrical Properties	Volume F	Volume Resistance		$\Omega$ -cm	$\geq\!1.0 {\rm x} 10^{12}$	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
	Insulation	Resista	ince	Ω	$\ge$ 1.0×10 <sup>9</sup>	$\ge$ 1.0×10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensior	nal	M.D.	%	-0.2~0.2	-0.2~0.2	IPC-TM650
	Stability		T.D.	70	-0.2~0.2	-0.2~0.2	2.2.4C
Physical and Thermal	Solder Float 10sec at 288℃ (550⁰F)			Pass	Pass	IPC-TM650 2.4.13	
Properties	Thickne	Thickness of total		um	88±10% 126±10%	105±10% 160±10%	ThinFlex
	UL Flar	me Clas	s		94V-0	94V-0	UL



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	Test item		Unit	J-0503ES J-0503ED	J-0505ES J-0505ED	Test Method
		As Received		≧0.72	≧0.72	
		Solder Float		≧0.62	≧0.62	IPC-TM650 2.4.9
Mechanical	Peel Strength	After Temp. Cycling	Kgf/cm	≧0.72	≧0.72	2.4.3
Properties		Chemical Resistance		≧0.58	≧0.58	IPC-TM650 2.3.2
	Flexural	M.D.	Times	≥150	≥150	JIS-C 6471
	Endurance	T.D.	Times	≦ 1 <b>00</b>	≦ 100	0.8mmR, 0.5kg
	Surface Re	esistance	Ω	$\ge 1.0 \times 10^{11}$	$\geq$ 1.0×10 <sup>11</sup>	IPC-TM650
Electrical Properties	Volume Re	esistance	$\Omega$ -cm	$\ge 1.0 \times 10^{12}$	$\ge 1.0 \times 10^{12}$	2.5.17
	Insulation F	Resistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensional	M.D.	%	-0.2~0.2	-0.2~0.2	IPC-TM650
	Stability	T.D.	70	-0.2~0.2	-0.2~0.2	2.2.4C
Physical and Thermal	Solder Float 10sec at 288℃(550⁰F)			Pass	Pass	IPC-TM650 2.4.13
Properties	Thickness	s of total	um	39±10% 65±10%	44±10% 75±10%	ThinFlex
	UL Flam	e Class		94V-0	94V-0	UL



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	Test item		Unit	J-1005ES J-1005ED	J-1010ED	J-2010ES J-2010ED	Test Method
		As Received		≧0.72	≧1.43	≧1.43	
	Peel	Solder Float	Kaflom	≧0.62	≧1.25	≧1.25	IPC-TM650 2.4.9
Mechanical Properties	Strength	After Temp. Cycling	Kgf/cm	≧0.72	≧1.43	≧1.43	
		Chemical Resistance		≧0.58	≧1.14	≧1.14	IPC-TM650 2.3.2
	Flexural	M.D.	Times	≧120	≧120	N/A	JIS-C 6471
	Endurance	T.D.					0.8mmR, 0.5kg
	Surface Resistance		Ω	$\ge 1.0 \times 10^{11}$	$\geq$ 1.0x10 <sup>11</sup>	$\ge 1.0 \times 10^{11}$	IPC-TM650
Electrical Properties	Volume Resistance		$\Omega$ -cm	$\geq$ 1.0 $\times$ 10 <sup>12</sup>	$\geq\!1.0{\times}10^{12}$	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
	Insulation F	ulation Resistance		$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensional	M.D.					IPC-TM650
	Stability	T.D.	%	-0.2~0.2	-0.2~0.2	-0.2~0.2	2.2.4C
Physical and Thermal	Solder 10sec at 28			Pass	Pass	Pass	IPC-TM650 2.4.13
Properties	Thicknes	s of total	um	58±10% 91±10%	135±10%	105±10% 160±10%	ThinFlex
	UL Flam	e Class		94V-0	94V-0	94V-0	UL



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	Test item		Unit	J-0505HD	J-1005HS	J-2005HS J-2005HD	J-2010HS	Test Method
		As Received		≧0.72	≧0.72	≧0.72	≧1.43	
	Peel	Solder Float		≧0.62	≧0.62	≧0.62	≧1.25	IPC-TM650 2.4.9
Mechanical	Strength	After Temp. Cycling	Kgf/cm	≧0.72	≧0.72	≧0.72	≧1.43	
Properties		Chemical Resistance		≧0.58	≧0.58	≧0.58	≧1.14	IPC-TM650 2.3.2
	Flexural Enduranc	M.D.	Times	≧200	≥150	N/A	N/A	JIS-C 6471 0.8mmR,
	е	T.D.						0.5kg
	Surface Resistance		Ω	$\ge$ 1.0x10 <sup>11</sup>	$\ge 1.0 \times 10^{11}$	$\ge$ 1.0×10 <sup>11</sup>	$\ge 1.0 \times 10^{11}$	IPC-TM650
Electrical Properties	Volume F	Resistance	$\Omega$ -cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
	Insulation	Resistance	Ω	≧1.0x10 <sup>9</sup>	≧1.0×10 <sup>9</sup>	≧1.0x10 <sup>9</sup>	≧1.0×10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimension	al M.D.	%	0.0.00		-0.2~0.2	00.00	IPC-TM650
	Stability	T.D.	70	-0.2~0.2	-0.2~0.2	-0.2~0.2	-0.2~0.2	2.2.4C
Physical and Thermal		Solder Float 10sec at 288℃ (550⁰F)		Pass	Pass	Pass	Pass	IPC-TM650 2.4.13
Properties	Thickne	ss of total	um	75±10%	58±10%	88±10% 126±10%	105±10%	ThinFlex
	UL Flar	ne Class		94V-0	94V-0	94V-0	94V-0	UL



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### 5. Storage:

ThinFlex-J will meet its shelf-life for at least 12 months after arrival at the user's factory when stored in the original packaging at temperatures of below 25°C and below 70% humidity. The products do not need refrigeration and should not be frozen.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

### **ThinFlex Corporation**

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# ThinFlex-K Copper Clad Laminate

ThinFlex-K is a metal clad polyimide film, furnished in the form of roll laminate with epoxy adhesive and copper cladding on one or both sides. ThinFlex-K can be used in the fabrication of flexible composites and flexible printed circuits (FPC). All copper clad laminates are available in roll form, and copper choices are RA and HTE types.

## 1. Product Characteristics:

- \* Excellent heat resistance
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Good dimensional stability
- \* Good flexibility
- \* Excellent thermal, mechanical and electrical properties

# 2. Specifications:



\*Other thicknesses and dimensions are available on customers' demand.



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3.	<b>Constructions:</b>	
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Single-Side	Double-Side
Copper foil	Copper foil
Epoxy Adhesive	Epoxy Adhesive
Polyimide film	Polyimide film
	Epoxy Adhesive
Properties:	Copper foil

## 4. Properties:

<b></b> 1 10pc1 0				1				
	Test item	Unit	K-0505RS K-0505RD K-0505HS K-0505HD	K-1005RS K-1005RD K-1005HS K-1005HD	K-1010RS K-1010RD K-1010HS K-1010HD	Test Method		
		As Received		≧1.00	≧1.50	≧2.00		
	Peel	Solder Float	Kaflara	Kaflore	≧1.00	≧1.50	≧2.00	IPC-TM650 2.4.9
Mechanical Properties	Strength	After Temp. Cycling	Kgf/cm	≧1.00	≧1.50	≧2.00		
		Chemical Resistance		≧1.00	≧1.50	≧2.00	IPC-TM650 2.3.2	
	Flexural Endurance	M.D.	Times	≧250	≥150	≧120	JIS-C 6471	
		T.D.	Times		≥ 150		0.8mmR, 0.5kg	
	Surface Resistance		Ω	$\ge 1.0 \times 10^{11}$	$\ge 1.0 \times 10^{11}$	$\ge 1.0 \times 10^{11}$	IPC-TM650	
Electrical Properties	Volume Resistance		Ω-cm	$\ge$ 1.0x10 <sup>12</sup>	$\ge 1.0 \times 10^{12}$	$\ge 1.0 \times 10^{12}$	2.5.17	
	Insulation Resistance		Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\geq$ 1.0×10 <sup>9</sup>	IPC-TM650 2.6.3.2	
	Dimensional	M.D.	%	-0.2~0.2	-0.2~0.2	-0.2~0.2	IPC-TM650	
	Stability	T.D.	70	-0.2 -0.2	-0.2 -0.2	-0.2 -0.2	2.2.4C	
Physical and Thermal		Solder Float 10sec at 288℃(550⁰F)		Pass	Pass	Pass	IPC-TM650 2.4.13	
Properties	Thickness	of total	um	44±10% 75±10%	58±10% 91±10%	75±10% 135±10%	ThinFlex	
	UL Flame	Test		Applying	Applying	Applying	UL	



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	Test item			K-2005RS K-2005RD K-2005HS K-2005HD	K-2010RS K-2010RD K-2010HS K-2010HD	Test Method
		As Received		≧1.50	≧2.00	
	Peel	Solder Float	Kgf/cm	≧1.50	≧2.00	IPC-TM650 2.4.9
Mechanical Properties	Strength	After Temp. Cycling	Kyi/cili	≧1.50	≧2.00	
		Chemical Resistance		≧1.50	≧2.00	IPC-TM650 2.3.2
	Flexural	M.D.	Times	N/A	N/A	JIS-C 6471 0.8mmR,
	Endurance	T.D.	TIMES			0.5kg
	Surface Res	sistance	Ω	$\geq$ 1.0 $\times$ 10 <sup>11</sup>	$\geq$ 1.0×10 <sup>11</sup>	IPC-TM650
Electrical Properties	Volume Res	olume Resistance		$\geq$ 1.0×10 <sup>12</sup>	$\geq$ 1.0×10 <sup>12</sup>	2.5.17
	Insulation Re	esistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensional	M.D.	%	-0.2~0.2	-0.2~0.2	IPC-TM650
	Stability	T.D.	/0	-0.2/0.2	-0.2~0.2	2.2.4C
Physical and Thermal		Solder Float 10sec at 288°∁ (550⁰F)		Pass	Pass	IPC-TM650 2.4.13
Properties	Thickness	of total	Um	88±10% 126±10%	105±10% 160±10%	ThinFlex
	UL Flame	Test		Applying	Applying	UL


#### 5. Storage:

ThinFlex-K will meet its shelf-life for at least 12 months after arrival at the user's factory when stored in the original packaging at temperatures of below 25°C and below 70% humidity. The products do not need refrigeration and should not be frozen.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

#### **ThinFlex Corporation**



# ThinFlex-T Copper Clad Laminate

ThinFlex-T is a metal clad polyimide film, furnished in the form of roll laminate with epoxy adhesive and copper cladding on one or both sides. ThinFlex-T can be used in the fabrication of flexible composites and flexible printed circuits (FPC). All copper clad laminates are available in roll form, and copper choices are RA, ED or HTE type.

#### 1. Product Characteristics:

- \* Excellent heat resistance
- \* Excellent flammability (Flame class UL 94V-0; UL File No. E219724)
- \* Excellent chemical resistance
- \* Good dimensional stability
- \* Good flexibility
- \* Excellent thermal, mechanical and electrical properties

### 2. Specifications:





#### **Double-Side**

Copper foil

Epoxy Adhesive

n 1 · de film

dhesive

r foil

**Test Method** 

IPC-TM650 2.4.9

IPC-TM650 2.3.2

JIS-C 6471 0.8mmR, 0.5kg

IPC-TM650

2.5.17

IPC-TM650 2.6.3.2

IPC-TM650 2.2.4C

IPC-TM650 2.4.13

ThinFlex

UL

Polyi	mide film				Polyimi	d
					Epoxy A	d
					Coppe	r
operties:						
	Test item		Unit	T-0502ES	T-0503ES	
		As Received		≧0.72	≧0.72	
	Peel	Solder Float	Kaflam	≧0.62	≧0.62	
Mechanical Properties	Strength	After Temp. Cycling	Kgī/cm	≧0.72	≧0.72	
·		Chemical Resistance		≧0.58	≧0.58	
	Flexural	M.D.	Timoo	≧150	≧150	
	Endurance	T.D.	Times	≧150	≧150	
	Surface Res	sistance	Ω	$\geq$ 1.0x10 <sup>11</sup>	$\geq$ 1.0x10 <sup>11</sup>	
Electrical Properties	Volume Res	sistance	$\Omega$ -cm	$\ge 1.0 \times 10^{12}$	$\ge 1.0 \times 10^{12}$	
·	Insulation Re	esistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	
	Dimensional	M.D.	0/2	-0.2~0.2	-0.2~0.2	oxy Ad Copper 03ES 0.72 0.62 0.72 0.62 0.72 0.58 150 150 150 150 150 150 150 150 200 200 200 200 200 200 200 200 200 2
	Stability	item       Unit       T-05         As       Received $\mathbb{R}$	-0.2 -0.2	-0.2 0.2		
Physical and Thermal				Pass	Pass	
Properties	Thickness	of total	um	36±10%	39±10%	
	UL Flame	Class		94V-0	94V-0	

#### 4. Prope

\* Above data are typical values, and are not guaranteed values.



#### **3.** Constructions: Single-Side

Copper foil

Epoxy Adhesive



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	Test item		Unit	T-0505RS	T-0505RD T-0505HD	Test Method
		As Received		≧0.72	≧0.72	
	Peel	Solder Float	Kaflom	≧0.62	≧0.62	IPC-TM650 2.4.9
Mechanical Properties	Strength	After Temp. Cycling	Kgf/cm	≧0.72	≧0.72	
		Chemical Resistance		≧0.58	≧0.58	IPC-TM650 2.3.2
	Flexural	M.D.	Times	≧250	≧200	JIS-C 6471
	Endurance	T.D.	Times	≧250	≧200	0.8mmR, 0.5kg
	Surface Res	sistance	Ω	$\ge$ 1.0×10 <sup>11</sup>	$\ge 1.0 \times 10^{11}$	IPC-TM650
Electrical Properties	Volume Res	sistance	$\Omega$ -cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
	Insulation Re	esistance	Ω	$\ge$ 1.0×10 <sup>9</sup>	≧1.0×10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensional	M.D.	0/			IPC-TM650
Dhusiaal	Stability	T.D.	%	-0.2~0.2	-0.2~0.2	2.2.4C
Physical and Thermal		Solder Float 10sec at 288℃ (550⁰F)		Pass	Pass	IPC-TM650 2.4.13
Properties	Thickness	of total	um	44±10%	75±10%	ThinFlex
	UL Flame	Class		94V-0	94V-0	UL



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	Test item		Unit	T-1005RS T-1005RD	T-1005HS T-1005HD	T-1005ES	Test Method
		As Received		≧0.72	≧0.72	≧0.72	
	Peel	Solder Float	Kgf/cm	≧0.62	≧0.62	≧0.62	IPC-TM650 2.4.9
Mechanical	Strength	After Temp. Cycling	Kyi/chi	≧0.72	≧0.72	≧0.72	
Properties		Chemical Resistance		≧0.58	≧0.58	≧0.58	IPC-TM650 2.3.2
	Flexural	M.D.	Times	≧150 ≧75	≧150	≧120	JIS-C 6471
	Endurance	T.D.	Times	≧150 ≧75	≧150	≧120	0.8mmR, 0.5kg
	Surface Res	istance	Ω	$\ge$ 1.0×10 <sup>11</sup>	$\ge 1.0 \times 10^{11}$	$\ge 1.0 \times 10^{11}$	IPC-TM650
Electrical Properties	Volume Res	istance	$\Omega$ -cm	$\ge 1.0 \times 10^{12}$	$\ge 1.0 \times 10^{12}$	$\ge 1.0 \times 10^{12}$	2.5.17
	Insulation Re	sistance	Ω	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	$\ge$ 1.0 $\times$ 10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensional	M.D.	%	-0.2~0.2	-0.2~0.2	-0.2~0.2	IPC-TM650
	Stability	T.D.	70	-0.2~0.2	-0.2~0.2	-0.2~0.2	2.2.4C
Physical and Thermal Properties		Solder Float 10sec at 288℃(550⁰F)		Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness of	of total	um	58±10% 91±10%	58±10% 91±10%	58±10%	ThinFlex
	UL Flame	Class		94V-0	94V-0	94V-0	UL



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	Test item		Unit	T-1010RS T-1010RD	T-1010ES T-1010ED	T-1010HS T-1010HD	Test Method
		As Received		≧1.43	≧1.43	≧1.43	
	Peel	Solder Float	Kaflam	≧1.25	≧1.25	≧1.25	IPC-TM650 2.4.9
Mechanical Properties	Strength	After Temp. Cycling	Kgf/cm	≧1.43	≧1.43	≧1.43	
		Chemical Resistance		≧1.14	≧1.14	≧1.14	IPC-TM650 2.3.2
	Flexural	M.D.	Times	≧150	≧120	≧150	JIS-C 6471
	Endurance	T.D.	Times	≧150	≧120	≧150	0.8mmR, 0.5kg
	Surface Re	esistance	Ω	$\ge$ 1.0x10 <sup>11</sup>	$\ge$ 1.0x10 <sup>11</sup>	$\ge 1.0 \times 10^{11}$	IPC-TM650
Electrical Properties	Volume Resistance		Ω-cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
	Insulation F	Resistance	Ω	≧1.0×10 <sup>9</sup>	≧1.0×10 <sup>9</sup>	$\ge$ 1.0×10 <sup>9</sup>	IPC-TM650 2.6.3.2
	Dimensional	M.D.	0/				IPC-TM650
	Stability	T.D.	%	-0.2~0.2	-0.2~0.2	-0.2~0.2	2.2.4C
Physical and Thermal Properties	Solder 10sec at 28			Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness	s of total	um	80±10% 135±10%	80±10% 135±10%	80±10% 135±10%	ThinFlex
	UL Flam	e Class		94V-0	94V-0	94V-0	UL



#### 5. Storage:

ThinFlex-T will meet its shelf-life for at least 12 months after arrival at the user's factory when stored in the original packaging at temperatures of below 25°C and below 70% humidity. The products do not need refrigeration and should not be frozen.

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#### **ThinFlex Corporation**



## ThinFlex-KB Bond Ply

ThinFlex-KB is a composite of polyimide film coated on both sides with flame-retardant modified epoxy adhesive. Bond ply can be used in the fabrication of flexible printed circuits (FPC) for circuit protection and insulation.

#### **1. Product Characteristics:**

- \* Excellent heat resistance
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Good dimensional stability
- \* Excellent thermal, mechanical, and electrical properties

### 2. Specifications:

	Item	KB-1010	KB-2005	
Polyimide Film Thickness		1.0 mil 2.0 mil		
	Туре	Epoxy Resin		
Adhesive	Thickness	25 μ m 13 μ m		
Sup	pply Size	L: 100	500±2mm +2/-0m type)	





### **3.** Construction:

Release film

Epoxy Adhesive

Polyimide film

Epoxy Adhesive

Release paper

#### 4. Properties:

Test item		Unit	KB-1010 KB-2005	Test Method
Dool Strongth	As Received	Kaflom	≧2.00	IPC-TM650
Peel Strength	After Soldering	Kgf/cm	≧2.00	2.4.9
Surface Resistance		Ω	$\geq$ 1.0x10 <sup>10</sup>	IPC-TM650
Volume Resistance	e	$\Omega$ -cm	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
Dimensional	MD	%	-0.2~0.2	IPC-TM650
Stability	TD	70	-0.2~0.2	2.2.4
Thickness Tolerance (w/o Release Paper)		%	±10	ThinFlex Method
Resin Flow		um	≦150	ThinFlex Method



# **Lamination and Process Conditions**

ThinFlex Bond Ply are typically used in the following ranges:

- A) Traditional Hot Press Conditions:
- 1. Part Temperature: 170-185°C
- 2. Pressure: 30-50 kg/cm<sup>2</sup>
- 3. Time: 30-60min, at temperature
- B) Fast Hot Press Condition:
- 1. Pre-Press Temp / Time / Pressure: 175-190°C / 10sec / kiss pressure
- 2. Hot-Press Temp / Time / Pressure: 175-190°C / 60-140sec / 80-100kg/cm<sup>2</sup>
- 3. Post Cure Condition: 160-170°C / 1-2 hour

#### 5. Storage:

ThinFlex-KB will meet its shelf-life for at least 3 months after arrival at the user's factory when stored in the original packaging in a dry place at temperatures below 6°C.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

#### **ThinFlex Corporation**



# ThinFlex-N Bond Ply

ThinFlex-N is a composite of polyimide film coated on both sides with flame-retardant modified epoxy adhesive. Bond ply can be used in the fabrication of flexible printed circuits (FPC) for circuit protection and insulation.

#### **1. Product Characteristics:**

- \* Excellent heat resistance
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Good dimensional stability
- \* Excellent thermal, mechanical, and electrical properties

### 2. Specifications:

Item		N-0510	N-1010	N-1012	N-1020			
Polyimide Film Thickness		0.5 mil	0.5 mil 1.0 mil 1.0 mil 1.0 m					
Adhasiya	Туре	Epoxy Resin						
Adnesive	Adhesive Thickness		25 $\mu$ m 25 $\mu$ m 30 $\mu$ m 50 $\mu$ m					
Supply Size		W: 250	/500±2mm, L	: 100+2/-0m (1	oll type)			





#### 3. Construction:

Release film Epoxy Adhesive Polyimide film Epoxy Adhesive Release paper

#### 4. Properties:

Test item		Unit	N-0510 N-1010 N-1012 N-1020	Test Method	
Dool Strongth	As Received	Kaflom	≧1.43	IPC-TM650	
Peel Strength	After Soldering	Kgf/cm	≧1.43	2.4.9	
Surface Resistance	Surface Resistance		$\geq$ 1.0x10 <sup>10</sup>	IPC-TM650	
Volume Resistance	e	$\Omega$ -cm	$\geq$ 1.0x10 <sup>12</sup>	2.5.17	
Dimensional	MD	0/	0.0.0.0	IPC-TM650	
Stability	TD	%	-0.2~0.2	2.2.4	
Thickness Tolerance (w/o Release Paper)		%	±10	ThinFlex Method	
Resin Flow		um	≦200	ThinFlex Method	



# **Lamination and Process Conditions**

ThinFlex Bond Ply are typically used in the following ranges:

- A) Traditional Hot Press Conditions:
- 1. Part Temperature: 170-185°C
- 2. Pressure: 30-50 kg/cm<sup>2</sup>
- 3. Time: 30-60min, at temperature
- B) Fast Hot Press Condition:
- 1. Pre-Press Temp / Time / Pressure: 175-190°C / 10sec / kiss pressure
- 2. Hot-Press Temp / Time / Pressure: 175-190°C / 60-140sec / 80-100kg/cm<sup>2</sup>
- 3. Post Cure Condition: 160-170°C / 1-2 hour

#### 5. Storage:

ThinFlex-N will meet its shelf-life for at least 3 months after arrival at the user's factory when stored in the original packaging in a dry place at temperatures below  $6^{\circ}$ C.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

#### **ThinFlex Corporation**



# ThinFlex-R Bonding Sheet (Halogen Free)

ThinFlex-R is an adhesive sheet coated on release paper or PET film with flame retardant modified halogen-free epoxy adhesive. This bonding sheet can be used in the fabrication of flexible printed circuits (FPC), rigid-flex circuit, as well as to bond stiffeners and heat sinks.

#### **1. Product Characteristics:**

- \* Excellent heat resistance
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Excellent thermal, mechanical and electrical properties

### 2. Specifications:

It	tem	<b>R-0005</b>	<b>R-0006</b>	<b>R-0010</b>	<b>R-0014</b>	<b>R-0020</b>		
	Туре	Halogen-Free Epoxy Resin						
Adhesive	Thickness	13 µ m	13 μ m 15 μ m 25 μ m 35 μ m 50 μ m					
Supply Size			$7: 250/500 \pm 21$	mm, L: 100 +2	2/-0m (roll typ	e)		



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### 3. Constructions:

**Release** Paper

Halogen-Free Epoxy Adhesive

PET Film

#### 4. Properties:

Test item		Unit	R-0005 R-0006 R-0010 R-0014 R-0020	Test Method
Peel	As Received	Kgf/cm	≧0.60	IPC-TM650
Strength	After Soldering	rigi/ciri	≧0.60	2.4.9
Th	ickness	um	±10%	ThinFlex
Adhesive Color			Light-Yellow	ThinFlex
Re	sin Flow	um	≤ <b>100</b>	ThinFlex



# Lamination and Process Conditions

ThinFlex Halogen-Free Bonding Sheet are typically used in the following ranges:

- A) Traditional Hot Press Conditions:
- 1. Part Temperature: 180-185°C
- 2. Pressure:  $30-35 \text{ kg/cm}^2$
- 3. Time: 45-60min, at temperature
- B) Fast Hot Press Condition:
- 1. Pre-Press Temp / Time / Pressure: 180-190°C / 5-10sec / kiss pressure
- 2. Hot-Press Temp / Time / Pressure: 180-190°C / 90-120sec / 80-130kg/cm<sup>2</sup>
- 3. Post Cure Condition: 185°C / 45-60 minutes

#### 5. Storage:

ThinFlex-R will meet its shelf-life for at least 3 months after arrival at the user's factory when stored in the original packaging in a dry place at temperatures below 6°C.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

#### **ThinFlex Corporation**



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#### Thin**Flex**

# ThinFlex-U Bonding Sheet (Halogen Free)

ThinFlex-U is an adhesive sheet coated on release paper with flame retardant modified halogenfree acrylic adhesive. This bonding sheet can be used in the fabrication of flexible printed circuits (FPC), rigid-flex circuit, as well as to bond stiffeners and heat sinks.

#### **1. Product Characteristics:**

- \* Excellent heat resistance
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Excellent thermal, mechanical and electrical properties

### 2. Specifications:

Item		<b>U-0005</b>	<b>U-0006</b>	<b>U-0010</b>	<b>U-0020</b>		
	Туре	Halogen-Free Acrylic Resin					
Adhesive	Thickness	$13 \mu\mathrm{m}$	$25\mu\mathrm{m}$	$50\mu\mathrm{m}$			
Supply Size		W: 250/	500±2mm, L: 1	00+2/-0m (rol	l type)		



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#### 3. Construction:

Halogen-free acrylic adhesive

Release paper

#### 4. Properties:

Те	Test item		U-0005 U-0006	U-0010 U-0020	Test Method
Peel	Peel As Received $\geq 0.71$ $\geq 1.43$		≧1.43	IPC-TM650	
Strength	After Soldering	Kgf/cm	≧0.71	≧1.43	2.4.9
	der Float ℃-30sec		No Delaminate and Blister	No Delaminate and Blister	ThinFlex
Th	Thickness		13±10% 15±10%	25±10% 50±10%	ThinFlex
Adhesive Color			Milk-White	Milk-White	ThinFlex
Re	Resin Flow		≤150	≤150	ThinFlex



# **Lamination and Process Conditions**

ThinFlex Acrylic Bonding Sheet are typically used in the following ranges:

A) Traditional Hot Press Conditions:

- 1. Part Temperature: 170-185°C
- 2. Pressure:  $30-50 \text{ kg/cm}^2$
- 3. Time: 30-60min, at temperature
- B) Fast Hot Press Condition:
- 1. Pre-Press Temp / Time / Pressure: 120-140°C / 10sec / kiss pressure
- 2. Hot-Press Temp / Time / Pressure: 120-140°C / 60-140sec / 80-100kg/cm<sup>2</sup>
- 3. Post Cure Condition: 160-170°C / 1-2 hour

#### 5. Storage:

ThinFlex-U will meet its shelf-life for at least 3 months after arrival at the user's factory when stored in the original packaging in a dry place at temperatures below  $6^{\circ}$ C.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

### **ThinFlex Corporation**



### ThinFlex-KC Bonding Sheet

ThinFlex-KC is an adhesive sheet coated on release film with flame retardant modified epoxy adhesive. This bonding sheet can be used in the fabrication of flexible printed circuits (FPC), rigid-flex circuit, as well as to bond stiffeners and heat sinks.

#### **1. Product Characteristics:**

- \* Excellent heat resistance
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Excellent thermal, mechanical and electrical properties

#### 2. Specifications:

ltem		KC-0005 KC-0010 KC-0014 KC-0020
	Туре	Modified epoxy resin
Adhesive	Thickness	13 $\mu$ m 25 $\mu$ m 35 $\mu$ m 50 $\mu$ m
Supply Size		W: 250/500±2mm, L: 100+2/-0m (roll type)



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#### 3. Constructions:

Release film Epoxy Adhesive Release paper

#### 4. Properties:

Test item		Unit	KC-0005	KC-0010 KC-0014 KC-0020	Test Method
Peel	As Received	Kgf/cm	≧1.50	≧2.00	IPC-TM650
Strength	After Soldering	Ngi/ciii	≧1.50	≧2.00	2.4.9
Thickness Tolerance		%	±10%	±10%	ThinFlex



# Lamination and Process Conditions

ThinFlex Epoxy Bonding Sheet are typically used in the following ranges:

A) Traditional Hot Press Conditions:

- 1. Part Temperature: 170-185°C
- 2. Pressure:  $30-50 \text{ kg/cm}^2$
- 3. Time: 30-60min, at temperature
- B) Fast Hot Press Condition:
- 1. Pre-Press Temp / Time / Pressure: 170-190°C / 10sec / kiss pressure
- 2. Hot-Press Temp / Time / Pressure: 170-190°C / 90-140sec / 80-120kg/cm2
- 3. Post Cure Condition: 160-170°C / 1-2 hour

#### 5. Storage:

ThinFlex-KC will meet its shelf-life for at least 3 months after arrival at the user's factory when stored in the original packaging in a dry place at temperatures below 6°C.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

#### **ThinFlex Corporation**



# ThinFlex-I Coverlay

ThinFlex-I is a composite of polyimide film coated on one side with flame retardant modified epoxy adhesive. Coverlay can be used in the fabrication of flexible printed circuits for circuit protection and insulation.

#### **1. Product Characteristics:**

- \* Excellent heat resistance
- \* Excellent flammability (Flame class UL 94V-0; UL File No. E219724)
- \* Excellent chemical resistance
- \* Good dimensional stability
- \* Excellent thermal, mechanical and electrical properties

		I-0505	I-1005	
Item		I-0507	I-1010	
lie	m	I-0508	I-1014	
		I-0510	I-1020	
Polyimic Thick		0.5 mil	1.0 mil	
	Туре	Epoxy resin		
		13 μ m	13 μ m	
Adhesive	Thickness	$18 \mu\mathrm{m}$	25 µ m	
	THICKNESS	20 $\mu$ m	$35\mu\mathrm{m}$	
		25 $\mu$ m	50 $\mu$ m	
Supply Size		W: 250/500±2mm, L:	: 100+2/-0m (roll type)	

\*Other thicknesses and dimensions are available on customers' demand.

#### Technical Data Sheet: I-Rev.1, June/2006



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### 3. Constructions:

Polyimide film Epoxy Adhesive (or Black Epoxy Adhesive) Release paper

#### 4. Properties:

Test item		Unit	I-0505 I-0507 I-0508 I-1005	I-0510 I-1010 I-1014 I-1020	Test Method
Peel	As Received		≧0.71	≧1.43	IPC-TM650
Strength	After Soldering	Kgf/cm	≧0.71	≧1.43	2.4.9
Surface R	Surface Resistance		$\geq$ 1.0x10 <sup>10</sup>	$\geq$ 1.0x10 <sup>10</sup>	IPC-TM650
Volume R	esistance	Ω-cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
Resin	Flow	$\mu$ m	≦200	≦200	ThinFlex
Dimensional Stability	M.D. T.D.	%	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
Thickness Tolerance		%	±10%	±10%	ThinFlex
UL Flam	e Class		94V-0	94V-0	UL



# Lamination and Process Conditions

ThinFlex Epoxy Coverlay are typically used in the following ranges:

- A) Traditional Hot Press Conditions:
- 1. Part Temperature: 170-185°C
- 2. Pressure: 30-50 kg/cm<sup>2</sup>
- 3. Time: 30-60min, at temperature
- B) Fast Hot Press Condition:
- 1. Pre-Press Temp / Time / Pressure: 170-190°C / 10sec / kiss pressure
- 2. Hot-Press Temp / Time / Pressure: 170-190°C / 90-140sec / 80-120kg/cm2
- 3. Post Cure Condition: 160-170°C / 1-2 hour

#### 5. Storage:

ThinFlex-I will meet its shelf-life for at least 3 months after arrival at the user's factory when stored in the original packaging in a dry place at temperatures below  $6^{\circ}$ C.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

#### **ThinFlex Corporation**



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### ThinFlex-M Halogen Free Coverlay

ThinFlex-M is a composite of polyimide film coated on one side with flame retardant modified halogen free epoxy adhesive. Coverlay can be used in the fabrication of flexible printed circuits for circuit protection and insulation.

#### **1. Product Characteristics:**

- \* Excellent heat resistance
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Good dimensional stability
- \* Excellent thermal, mechanical and electrical properties
- \* No ion migration for a long time
- \* High Tg

#### 2. Specifications:

lte	em	M-0505 M-0506 M-0508 M-0510 M-0514	M-1010 M-1014 M-1020	
	ide Film kness	0.5 mil	1.0 mil	
	Туре	Epoxy resin		
Adhesive Thickness		13 μ m 15 μ m 20 μ m 25 μ m 35 μ m	25 μ m 35 μ m 50 μ m	
Supply Size		W: 250/500±2mm, L:	: 100+2/-0m (roll type)	

\*Other thicknesses and dimensions are available on customers' demand.

Technical Data Sheet: M-Rev.1, June/2006



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### 3. Constructions:

Polyimide film Halogen Free Epoxy Adhesive Release paper

#### 4. Properties:

Test item		Unit	M-0505 M-0506 M-0508 M-0510	M-0514 M-1010 M-1014 M-1020	Test Method
Peel	As Received		≧0.60	≧0.70	IPC-TM650
Strength	After Soldering	– Kgf/cm	≧0.60	≧0.70	2.4.9
Surface R	Surface Resistance		$\geq$ 1.0x10 <sup>10</sup>	$\geq$ 1.0x10 <sup>10</sup>	IPC-TM650
Volume R	esistance	Ω-cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
Resin	Flow	$\mu$ m	≦150	≦150	ThinFlex
Dimensional	M.D.	%	-0.2~0.2	-0.2~0.2	IPC-TM650
Stability	T.D.	70	-0.2~0.2	-0.2~0.2	2.2.4C
Thickness Tolerance		%	±10%	±10%	ThinFlex
UL Flam	e Class		Applying	Applying	UL



# **Lamination and Process Conditions**

ThinFlex Halogen Free Coverlay are typically used in the following ranges:

A) Traditional Hot Press Conditions:

- 1. Part Temperature: 170-185°C
- 2. Pressure:  $30-50 \text{ kg/cm}^2$
- 3. Time: 30-60min, at temperature
- B) Fast Hot Press Condition:
- 1. Pre-Press Temp / Time / Pressure: 170-190°C / 10sec / kiss pressure
- 2. Hot-Press Temp / Time / Pressure: 170-190°C / 90-140sec / 80-120kg/cm2
- 3. Post Cure Condition: 160-170°C / 1-2 hour

#### 5. Storage:

ThinFlex-M will meet its shelf-life for at least 3 months after arrival at the user's factory when stored in the original packaging in a dry place at temperatures below 6°C.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

### **ThinFlex Corporation**



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### ThinFlex-Q Halogen Free Coverlay

ThinFlex-Q is a composite of polyimide film coated on one side with flame retardant modified halogen free epoxy adhesive. Coverlay can be used in the fabrication of flexible printed circuits for circuit protection and insulation.

#### **1. Product Characteristics:**

- \* Excellent heat resistance
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Good dimensional stability
- \* Excellent thermal, mechanical and electrical properties
- \* High Tg

#### 2. Specifications:

ltem		Q-0505 Q-0506 Q-0508 Q-0510 Q-0514	Q-1010 Q-1014 Q-1020	
	ide Film kness	0.5 mil 1.0 mil		
	Туре	Epoxy resin		
Adhesive		13 $\mu$ m 15 $\mu$ m 20 $\mu$ m 25 $\mu$ m 35 $\mu$ m	$25\mu$ m 35 $\mu$ m 50 $\mu$ m	
Supply Size		W: 250/500 ±	2mm, L: 100 +2/-0m (roll type)	



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### 3. Constructions:

Polyimide film Halogen Free Epoxy Adhesive Release paper

### 4. Properties:

Test item		Unit	Q-0505 Q-0506 Q-0508 Q-0510	Q-0514 Q-1010 Q-1014 Q-1020	Test Method
Peel	As Received	Kgf/cm	≧0.70	≧1.00	IPC-TM650
Strength	After Soldering	- Kgi/cili	≧0.70	≧1.00	2.4.9
Surface R	Surface Resistance		$\geq$ 1.0x10 <sup>10</sup>	$\ge 1.0 \times 10^{10}$	IPC-TM650
Volume R	esistance	Ω-cm	$\geq$ 1.0x10 <sup>12</sup>	$\ge$ 1.0x10 <sup>12</sup>	2.5.17
Resin	Flow	$\mu$ m	≦150	≦150	ThinFlex
Dimensional	M.D.	0/		-0.2~0.2	IPC-TM650
Stability T.D.		%	-0.2~0.2	-0.2~0.2	2.2.4C
Thickness	Thickness Tolerance		±10%	±10%	ThinFlex
UL Flam	e Class		94V-0	94V-0	UL



# **Lamination and Process Conditions**

ThinFlex Halogen Free Coverlay are typically used in the following ranges:

A) Traditional Hot Press Conditions:

- 1. Part Temperature: 170-185°C
- 2. Pressure:  $30-50 \text{ kg/cm}^2$
- 3. Time: 30-60min, at temperature
- B) Fast Hot Press Condition:
- 1. Pre-Press Temp / Time / Pressure: 170-190°C / 10sec / kiss pressure
- 2. Hot-Press Temp / Time / Pressure: 170-190°C / 90-140sec / 80-120kg/cm2
- 3. Post Cure Condition: 180-190°C / 60-90 minutes

#### 5. Storage:

ThinFlex-Q will meet its shelf-life for at least 3 months after arrival at the user's factory when stored in the original packaging in a dry place at temperatures below 6°C.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

### **ThinFlex Corporation**



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## ThinFlex-V Halogen Free Coverlay

ThinFlex-V is a composite of polyimide film coated on one side with flame retardant modified halogen free acrylic adhesive. Coverlay can be used in the fabrication of flexible printed circuits for circuit protection and insulation.

#### **1. Product Characteristics:**

- \* Excellent heat resistance
- \* Halogen free
- \* Excellent chemical resistance
- \* Excellent thermal, mechanical and electrical properties

#### 2. Specifications:

ltem		V-0505 V-0510	V-1010 V-1020	
	ide Film kness	0.5 mil	1.0 mil	
	Туре	Acrylic resin		
Adhesive	Thickness	13 μ m 25 μ m	25 μ m 50 μ m	
Supply Size		W: 250/500±2mm, L	: 100+2/-0m (roll type)	



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### 3. Constructions:

Polyimide film Halogen Free Acrylic Adhesive Release paper

#### 4. Properties:

Test item		Unit	V-0505 V-0510	V-1010 V-1020	Test Method	
Peel	R	As eceived	Kgf/cm	≧0.60	≧0.90	IPC-TM650
Strength	S	After oldering	Ngi/ciii	≧0.60	≧0.90	2.4.9
Surface R	Surface Resistance		Ω	$\geq$ 1.0×10 <sup>10</sup>	$\ge$ 1.0x10 <sup>10</sup>	IPC-TM650
Volume R	esist	ance	$\Omega$ -cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	2.5.17
Resin	Flow	v	$\mu$ m	≦200	≦200	ThinFlex
Dimensional		M.D.	0/	-0.2~0.2	-0.2~0.2	IPC-TM650
Stability T.D.		%	-0.2~0.2	-0.2 -0.2	2.2.4C	
Thickness Tolerance		%	±10%	±10%	ThinFlex	
UL Flam	e Cla	ass		94V-0	94V-0	UL



# **Lamination and Process Conditions**

ThinFlex Halogen Free Coverlay are typically used in the following ranges:

A) Traditional Hot Press Conditions:

- 1. Part Temperature: 170-185°C
- 2. Pressure:  $30-50 \text{ kg/cm}^2$
- 3. Time: 30-60min, at temperature
- B) Fast Hot Press Condition:
- 1. Pre-Press Temp / Time / Pressure: 170-190°C / 10sec / kiss pressure
- 2. Hot-Press Temp / Time / Pressure: 170-190°C / 90-140sec / 80-120kg/cm<sup>2</sup>
- 3. Post Cure Condition: 160-180°C / 30-120 minutes

#### 5. Storage:

ThinFlex-V will meet its shelf-life for at least 3 months after arrival at the user's factory when stored in the original packaging in a dry place at temperatures below 6°C.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

#### **ThinFlex Corporation**



# ThinFlex-KA Coverlay

ThinFlex-KA is a composite of polyimide film coated on one side with flame retardant modified epoxy adhesive. Coverlay can be used in the fabrication of flexible printed circuits for circuit protection and insulation.

#### **1. Product Characteristics:**

- \* Excellent heat resistance
- \* Excellent flammability
- \* Excellent chemical resistance
- \* Good dimensional stability
- \* Excellent thermal, mechanical and electrical properties

### 2. Specifications:

ltem		KA-0505 KA-0506 KA-0507 KA-0510	KA-1005 KA-1010 KA-1014 KA-1020	KA-2014	
Polyimic Thick		0.5 mil 1.0 mil 2.0		2.0 mil	
	Туре	Epoxy resin			
Adhesive	Thickness	13 $\mu$ m 15 $\mu$ m 18 $\mu$ m 25 $\mu$ m	13 μ m 25 μ m 35 μ m 50 μ m	$35\mu\mathrm{m}$	
Supply Size		W: 250/500±2	mm, L: 100+2/-0n	n (roll type)	



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### 3. Constructions:

Polyimide film Epoxy Adhesive (or Black Epoxy Adhesive) Release paper

### 4. Properties:

Test item		Unit	KA-0505 KA-0506 KA-0507 KA-0510 KA-1005	KA-1010 KA-1014 KA-1020 KA-2014	Test Method
Peel Strength	As Received	- Kgf/cm	≧1.00	≧1.50	IPC-TM650 2.4.9
	After Soldering		≧1.00	≧1.50	
Surface Resistance		Ω	$\geq$ 1.0x10 <sup>10</sup>	$\geq$ 1.0x10 <sup>10</sup>	IPC-TM650 2.5.17
Volume Resistance		Ω-cm	$\geq$ 1.0x10 <sup>12</sup>	$\geq$ 1.0x10 <sup>12</sup>	
Resin Flow		$\mu$ m	≦150	≦150	ThinFlex
Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
	T.D.				
Thickness Tolerance		%	±10%	±10%	ThinFlex
UL Flame Class			Applying	Applying	UL



# **Lamination and Process Conditions**

ThinFlex Epoxy Coverlay are typically used in the following ranges:

- A) Traditional Hot Press Conditions:
- 1. Part Temperature: 170-185°C
- 2. Pressure:  $30-50 \text{ kg/cm}^2$
- 3. Time: 30-60min, at temperature
- B) Fast Hot Press Condition:
- 1. Pre-Press Temp / Time / Pressure: 170-190°C / 10sec / kiss pressure
- 2. Hot-Press Temp / Time / Pressure: 170-190°C / 90-140sec / 80-120kg/cm2
- 3. Post Cure Condition: 160-170°C / 1-2 hour

#### 5. Storage:

ThinFlex-KA will meet its shelf-life for at least 3 months after arrival at the user's factory when stored in the original packaging in a dry place at temperatures below 6°C.

Note: The information and data contained in this technical literature is believed to be accurate and is offered in good faith for the benefit of the user. The user should make his own tests to verify the suitability of this product for any application before its use. All data are typical values only and subject to change without notice.

#### **ThinFlex Corporation**