ThinFlex

ThinFlex Corporation
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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:

A - 10 10 R D

Product	Thickness of PI	Thickness of Cu	Cu Type	Structure
A : D/S FCCL	10 : 1.0 mil 20 : 2.0 mil	02 : 1/4 oz 03 : 1/3 oz 05 : 1/2 oz 10 : 1.0 oz	R : RA E : ED	Double-sided
Supply Size	W: 250/500 ± 2mm; L: 400~700 ± 2mm (sheet type) W: 250/500 ± 2mm; L: 50 +2/-0m (roll type)			

***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
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧ 0.80	≧ 1.00	≧ 1.20	IPC-TM650 2.4.9
		Solder Float		≧ 0.80	≧ 1.00	≧ 1.20	
		After Temp. Cycling		≧ 0.80	≧ 1.00	≧ 1.20	
		Chemical Resistance		≧ 0.80	≧ 1.00	≧ 1.20	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧300	≧300	≧300	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧300	≧300	≧300	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.					
	Solder Float 10sec at 288℃(550^{0}F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness Tolerance		%	±10%	±10%	±10%	ThinFlex
	Ion Migration (1000hr/85%/85℃/50VDC)		--	Pass	Pass	Pass	--
	UL Flame Class		--	94V-0	94V-0	94V-0	UL

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

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Test item			Units	A-2002ED A-2003RD A-2005RD	A-2010RD A-2010ED	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧ 0.80	≧ 1.00	IPC-TM650 2.4.9
		Solder Float		≧ 0.80	≧ 1.00	
		After Temp. Cycling		≧ 0.80	≧ 1.00	
		Chemical Resistance		≧ 0.80	≧ 1.00	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	N/A	N/A	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		N/A	N/A	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.				
	Solder Float 10sec at 288℃(550^{0}F)		--	Pass	Pass	IPC-TM650 2.4.13
	Thickness Tolerance		%	±10%	±10%	ThinFlex
	Ion Migration (1000hr/85%/85℃/50VDC)		--	Pass	Pass	--
	UL Flame Class		--	94V-0	94V-0	UL

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Test item			Units	A-2003ED A-2005ED	A-2020RD A-2020ED	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧ 1.20	≧ 2.00	IPC-TM650 2.4.9
		Solder Float		≧ 1.20	≧ 2.00	
		After Temp. Cycling		≧ 1.20	≧ 2.00	
		Chemical Resistance		≧ 1.20	≧ 2.00	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	N/A	N/A	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		N/A	N/A	
Electrical Properties	Surface Resistance		Ω	$\geqq 1.0\times10^{11}$	$\geqq 1.0\times10^{11}$	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	$\geqq 1.0\times10^{12}$	$\geqq 1.0\times10^{12}$	
	Insulation Resistance		Ω	$\geqq 1.0\times10^{9}$	$\geqq 1.0\times10^{9}$	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.				
	Solder Float 10sec at 288℃(550°F)		--	Pass	Pass	IPC-TM650 2.4.13
	Thickness Tolerance		%	±10%	±10%	ThinFlex
	Ion Migration (1000hr/85%/85℃/50VDC)		--	Pass	Pass	--
	UL Flame 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.

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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:

G - 10 10 R D

Product	Thickness of PI	Thickness of Cu	Cu Type	Structure
G : D/S FCCL	10 : 1.0 mil	02 : 1/4 oz 03 : 1/3oz 05 : 1/2 oz 10 : 1.0 oz	R : RA E : ED	Double-sided
Supply Size	W: 250/500 ± 2mm; L: 50 +2/-0m (roll type)			

***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	G-1005RD G-1003RD G-1002ED	G-1010RD G-1010ED G-1003ED	G-1005ED	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.80	≧1.00	≧1.20	IPC-TM650 2.4.9
		Solder Float		≧0.80	≧1.00	≧1.20	
		After temp. cycling		≧0.80	≧1.00	≧1.20	
		Chemical Resistance		≧0.80	≧1.00	≧1.20	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧300	≧300	≧300	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧300	≧300	≧300	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.		0.0~0.15	0.0~0.15	0.0~0.15	
	Solder Float 10sec at 288℃(550^{0}F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness Tolerance		%	±10%	±10%	±10%	ThinFlex
	Ion Migration (1000hr/85%/85℃/50VDC)		--	Pass	Pass	Pass	--
	UL Flame 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.

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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:

G6 - 06 10 E D

Product	Thickness of PI	Thickness of Cu	Cu Type	Structure
G6 : D/S FCCL	06 : 0.6 mil	02 : 1/4 oz 03 : 1/3oz 05 : 1/2 oz 10 : 1.0 oz	R : RA E : ED	Double-sided
Supply Size	W: 250/500 ± 2mm; L: 50 +2/-0m (roll type)			

***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
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧ 0.54	≧ 0.60	IPC-TM650 2.4.9
		Solder Float		≧ 0.54	≧ 0.60	
		After temp. cycling		≧ 0.54	≧ 0.60	
		Chemical Resistance		≧ 0.54	≧ 0.60	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧300	≧300	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧300	≧300	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.		0.0~0.15	0.0~0.15	
	Solder Float 10sec at 288℃(550^{0}F)		--	Pass	Pass	IPC-TM650 2.4.13
	Thickness Tolerance		%	±10%	±10%	ThinFlex
	Ion Migration (1000hr/85%/85℃/50VDC)		--	Pass	Pass	--
	UL Flame 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.

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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:

H - 10 10 R S

Product	Thickness of PI	Thickness of Cu	Cu Type	Structure
H : 2-FCCL	05 : 0.5 mil 08 : 0.8 mil 10 : 1.0 mil	03 : 1/3oz 05 : 1/2 oz 10 : 1.0 oz	R : RA E : ED	Single-sided
Supply Size	W: 250/500 ± 2mm; L: 100 +2/-0m (roll type), splice ≦3			

***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
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.90	≧1.00	≧1.07	IPC-TM650 2.4.9
		Solder Float		≧0.90	≧1.00	≧1.07	
		After Temp. Cycling		≧0.90	≧1.00	≧1.07	
		Chemical Resistance		≧0.90	≧1.00	≧1.07	IPC-TM650 2.3.2
	Tensile strength (base film)		kg/mm^2	20	20	20	IPC-TM-650 Method 2.4.19
	Elongation (base film)		%	20	20	20	
	Tensile Modulus (base film)		kg/mm^2	720	720	720	ASTM D882
	Initial Tear Strength (base 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 Endurance	M.D.	Times	≧500	≧500	≧300	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧500	≧500	≧300	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
	Dielectric Strength (base film)		KV/mil	6.0	6.0	6.0	ASTM-D-149
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.					
	Solder Float 10sec at 288℃(550°F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	43±10%	43±10%	60±10% 48±10%	ThinFlex
	UL Flame Class		--	94V-0	94V-0	94V-0	UL

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Test item			Unit	H-1010ES	H-0505RS	H-0505ES	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧1.20	≧0.70	≧0.60	IPC-TM650 2.4.9
		Solder Float		≧1.20	≧0.70	≧0.60	
		After Temp. Cycling		≧1.20	≧0.70	≧0.60	
		Chemical Resistance		≧1.20	≧0.70	≧0.60	IPC-TM650 2.3.2
	Tensile strength (base film)		kg/mm^2	20	18.5	18.5	IPC-TM-650 Method 2.4.19
	Elongation (base film)		%	20	13	13	
	Tensile Modulus (base film)		kg/mm^2	720	770	770	ASTM D882
	Initial Tear Strength (base film)		g	1500	720	720	IPC-TM-650 Method 2.4.16
	Propagation Tear Strength (base film)		g	15	5	5	IPC-TM-650 Method 2.4.17.1
	Flexural Endurance	M.D.	Times	≧300	≧800	≧800	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧300	≧800	≧800	
Electrical Properties	Surface Resistance		Ω	$\geqq 1.0\times10^{11}$	$\geqq 1.0\times10^{11}$	$\geqq 1.0\times10^{11}$	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	$\geqq 1.0\times10^{12}$	$\geqq 1.0\times10^{12}$	$\geqq 1.0\times10^{12}$	
	Insulation Resistance		Ω	$\geqq 1.0\times10^{9}$	$\geqq 1.0\times10^{9}$	$\geqq 1.0\times10^{9}$	IPC-TM650 2.6.3.2
	Dielectric Strength (base film)		KV/mil	6.0	5.0	5.0	ASTM-D-149
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.					
	Solder Float 10sec at 288℃(550°F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	60±10%	31±10%	31±10%	ThinFlex
	UL Flame Class		--	94V-0	94V-0	94V-0	UL

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Test item			Unit	H-0805RS	H-0805ES	H-1003RS	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.90	≧0.80	≧0.80	IPC-TM650 2.4.9
		Solder Float		≧0.90	≧0.80	≧0.80	
		After Temp. Cycling		≧0.90	≧0.80	≧0.80	
		Chemical Resistance		≧0.90	≧0.80	≧0.80	IPC-TM650 2.3.2
	Tensile strength (base film)		kg/mm^2	20	20	20	IPC-TM-650 Method 2.4.19
	Elongation (base film)		%	20	20	20	
	Tensile Modulus (base film)		kg/mm^2	730	730	720	ASTM D882
	Initial Tear Strength (base film)		g	1400	1400	1500	IPC-TM-650 Method 2.4.16
	Propagation Tear Strength (base film)		g	10	10	15	IPC-TM-650 Method 2.4.17.1
	Flexural Endurance	M.D.	Times	≧600	≧600	≧500	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧600	≧600	≧500	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
	Dielectric Strength (base film)		KV/mil	6.0	6.0	6.0	ASTM-D-149
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.					
	Solder Float 10sec at 288℃(550°F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	38±10%	38±10%	38 ±10%	ThinFlex
	UL Flame Class		--	94V-0	94V-0	94V-0	UL

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

ThinFlex®

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Test item			Unit	H-1003ES	H-0803RS	H-0803ES	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.90	≧0.60	≧0.70	IPC-TM650 2.4.9
		Solder Float		≧0.90	≧0.60	≧0.70	
		After Temp. Cycling		≧0.90	≧0.60	≧0.70	
		Chemical Resistance		≧0.90	≧0.60	≧0.70	IPC-TM650 2.3.2
	Tensile strength (base film)		kg/mm^2	20	20	20	IPC-TM-650 Method 2.4.19
	Elongation (base film)		%	20	20	20	
	Tensile Modulus (base film)		kg/mm^2	720	730	730	ASTM D882
	Initial Tear Strength (base film)		g	1500	1400	1400	IPC-TM-650 Method 2.4.16
	Propagation Tear Strength (base film)		g	15	10	10	IPC-TM-650 Method 2.4.17.1
	Flexural Endurance	M.D.	Times	≧500	≧800	≧800	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧500	≧800	≧800	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
	Dielectric Strength (base film)		KV/mil	6.0	6.0	6.0	ASTM-D-149
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.					
	Solder Float 10sec at 288℃(550°F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	38 ±10%	33±10%	33±10%	ThinFlex
	UL Flame Class		--	94V-0	94V-0	94V-0	UL

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Test item			Unit	H-0503RS	H-0503ES	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.60	≧0.70	IPC-TM650 2.4.9
		Solder Float		≧0.60	≧0.70	
		After Temp. Cycling		≧0.60	≧0.70	
		Chemical Resistance		≧0.60	≧0.70	IPC-TM650 2.3.2
	Tensile strength (base film)		kg/mm^2	18.5	18.5	IPC-TM-650 Method 2.4.19
	Elongation (base film)		%	13	13	
	Tensile Modulus (base film)		kg/mm^2	770	770	ASTM D882
	Initial Tear Strength (base film)		g	720	720	IPC-TM-650 Method 2.4.16
	Propagation Tear Strength (base film)		g	5	5	IPC-TM-650 Method 2.4.17.1
	Flexural Endurance	M.D.	Times	≧1200	≧1200	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧1200	≧1200	
Electrical Properties	Surface Resistance		Ω	$\geqq 1.0\times10^{11}$	$\geqq 1.0\times10^{11}$	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	$\geqq 1.0\times10^{12}$	$\geqq 1.0\times10^{12}$	
	Insulation Resistance		Ω	$\geqq 1.0\times10^{9}$	$\geqq 1.0\times10^{9}$	IPC-TM650 2.6.3.2
	Dielectric Strength (base film)		KV/mil	5.0	5.0	ASTM-D-149
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.				
	Solder Float 10sec at 288℃(550^{0}F)		--	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	26±10%	26±10%	ThinFlex
	UL Flame 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.

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ThinFlex

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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:

X - 10 05 R S

Product	Thickness of PI	Thickness of Cu	Cu Type	Structure
X : 2-FCCL	05 : 0.5 mil 08 : 0.8 mil 10 : 1.0 mil	03 : 1/3oz 05 : 1/2 oz	R : RA E : ED	Single-sided
Supply Size	W: 250/500 ± 2mm; L: 100 +2/-0m (roll type), splice ≦3			

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

ThinFlex

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3. Construction:

Copper foil
Polyimide film

4. Properties:

Test item			Unit	X-0505RS X-0505ES	X-0805RS X-0805ES	X-1005RS X-1005ES	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.60	≧0.80	≧0.60	IPC-TM650 2.4.9
		Solder Float		≧0.60	≧0.80	≧0.60	
		After Temp. Cycling		≧0.60	≧0.80	≧0.60	
		Chemical Resistance		≧0.60	≧0.80	≧0.60	IPC-TM650 2.3.2
	Tensile strength (base film)		kg/mm^2	30	30	32	IPC-TM-650 Method 2.4.19
	Elongation (base film)		%	32	35	40	
	Tensile Modulus (base film)		kg/mm^2	650	600	580	ASTM D882
	Initial Tear Strength (base film)		g	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 Endurance	M.D.	Times	≧900	≧700	≧600	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧900	≧700	≧600	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
	Dielectric Strength (base film)		KV/mil	5.0	6.0	6.0	ASTM-D-149
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	-0.1~ 0.1	IPC-TM650 2.2.4C
		T.D.					
	Solder Float 10sec at 288℃(550°F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	31±10%	38±10%	43±10%	ThinFlex
	UL Flame Class		--	94V-0	94V-0	94V-0	UL

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

ThinFlex®

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Test item			Unit	X-0503RS	X-0503ES	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.60	≧0.60	IPC-TM650 2.4.9
		Solder Float		≧0.60	≧0.60	
		After Temp. Cycling		≧0.60	≧0.60	
		Chemical Resistance		≧0.60	≧0.60	IPC-TM650 2.3.2
	Tensile strength (base film)		kg/mm^2	30	30	IPC-TM-650 Method 2.4.19
	Elongation (base film)		%	32	32	
	Tensile Modulus (base film)		kg/mm^2	650	650	ASTM D882
	Initial Tear Strength (base 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 Endurance	M.D.	Times	≧1300	≧1300	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧1300	≧1300	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
	Dielectric Strength (base film)		KV/mil	5.0	5.0	ASTM-D-149
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.				
	Solder Float 10sec at 288℃(550^0F)		--	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	26±10%	26±10%	ThinFlex
	UL Flame Class		--	94V-0	94V-0	UL

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Test item			Unit	X-0803RS	X-0803ES	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.60	≧0.80	IPC-TM650 2.4.9
		Solder Float		≧0.60	≧0.80	
		After Temp. Cycling		≧0.60	≧0.80	
		Chemical Resistance		≧0.60	≧0.80	IPC-TM650 2.3.2
	Tensile strength (base film)		kg/mm^2	30	30	IPC-TM-650 Method 2.4.19
	Elongation (base film)		%	35	35	
	Tensile Modulus (base film)		kg/mm^2	600	600	ASTM D882
	Initial Tear Strength (base 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 Endurance	M.D.	Times	≧900	≧900	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧900	≧900	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
	Dielectric Strength (base film)		KV/mil	6.0	6.0	ASTM-D-149
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.				
	Solder Float 10sec at 288℃(550°F)		--	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	33±10%	33±10%	ThinFlex
	UL Flame Class		--	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.

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ThinFlex

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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:

P - 10 05 E D

Product	Thickness of PI	Thickness of Cu	Cu Type	Structure
P : D/S 2FCCL	10 : 1.0 mil	05 : 1/2 oz	E : ED	Double-sided
Supply Size	W: 250/500 ± 2mm; L: 100 +2/-0m (roll type)			

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

ThinFlex

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3. Constructions:

Copper foil
LCP film
Copper foil

4. Properties:

Test item			Unit	P-1005ED	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧ 0.80	IPC-TM650 2.4.9
		Solder Float		≧ 0.80	
		After temp. cycling		≧ 0.80	
		Chemical Resistance		≧ 0.80	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧300	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧300	
Electrical Properties	Surface Resistance		Ω	$\geqq 1.0\times10^{11}$	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	$\geqq 1.0\times10^{12}$	
	Insulation Resistance		Ω	$\geqq 1.0\times10^{9}$	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.1~0.1	IPC-TM650 2.2.4C
		T.D.			
	Solder Float 10sec at 288℃(550°F)		--	Pass	IPC-TM650 2.4.13
	Thickness Tolerance		%	±20%	ThinFlex
	Ion Migration (1000hr/85%/85℃/50VDC)		--	Pass	--
	UL Flame Test		--	Applying	UL

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

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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.

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ThinFlex

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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:

J - 10 10 R S

Product	Thickness of PI	Thickness of Cu	Cu Type	Structure
J : 3-FCCL	05 : 0.5 mil 10 : 1.0 mil 20 : 2.0 mil	03 : 1/3 oz 05 : 1/2 oz 10 : 1.0 oz	R : RA E : ED H : HTE	Single-sided Double-sided
Supply Size	S/S: W: 250/500 ± 2mm; L: 100 +2/-0 m (roll type) D/S: W: 250/500 ± 2mm; L: 50 +2/-0 m (roll type)			

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

ThinFlex®

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3. Constructions:

Single-Side

Copper foil
Epoxy Adhesive
Polyimide film

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
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.72	≧0.72	≧1.43	IPC-TM650 2.4.9
		Solder Float		≧0.62	≧0.62	≧1.25	
		After Temp. Cycling		≧0.72	≧0.72	≧1.43	
		Chemical Resistance		≧0.58	≧0.58	≧1.14	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧250	≧150 ≧75	≧150	JIS-C 6471 0.8mmR, 0.5kg
		T.D.					
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
		T.D.					
	Solder Float 10sec at 288℃(550°F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	44±10% 75±10%	58±10% 91±10%	135±10%	ThinFlex
	UL Flame Class		--	94V-0	94V-0	94V-0	UL

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

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Test item			Unit	J-2005RS J-2005RD	J-2010RS J-2010RD	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.72	≧1.43	IPC-TM650 2.4.9
		Solder Float		≧0.62	≧1.25	
		After Temp. Cycling		≧0.72	≧1.43	
		Chemical Resistance		≧0.58	≧1.14	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	N/A	N/A	JIS-C 6471 0.8mmR, 0.5kg
		T.D.				
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
		T.D.				
	Solder Float 10sec at 288℃(550^{0}F)		--	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	88±10% 126±10%	105±10% 160±10%	ThinFlex
	UL Flame Class		--	94V-0	94V-0	UL

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

ThinFlex®

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Test item			Unit	J-0503ES J-0503ED	J-0505ES J-0505ED	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.72	≧0.72	IPC-TM650 2.4.9
		Solder Float		≧0.62	≧0.62	
		After Temp. Cycling		≧0.72	≧0.72	
		Chemical Resistance		≧0.58	≧0.58	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧150	≧150	JIS-C 6471 0.8mmR, 0.5kg
		T.D.				
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
		T.D.				
	Solder Float 10sec at 288℃(550^{0}F)		--	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	39±10% 65±10%	44±10% 75±10%	ThinFlex
	UL Flame 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
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.72	≧1.43	≧1.43	IPC-TM650 2.4.9
		Solder Float		≧0.62	≧1.25	≧1.25	
		After Temp. Cycling		≧0.72	≧1.43	≧1.43	
		Chemical Resistance		≧0.58	≧1.14	≧1.14	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧120	≧120	N/A	JIS-C 6471 0.8mmR, 0.5kg
		T.D.					
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
		T.D.					
	Solder Float 10sec at 288℃(550^{0}F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	58±10% 91±10%	135±10%	105±10% 160±10%	ThinFlex
	UL Flame 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
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.72	≧0.72	≧0.72	≧1.43	IPC-TM650 2.4.9
		Solder Float		≧0.62	≧0.62	≧0.62	≧1.25	
		After Temp. Cycling		≧0.72	≧0.72	≧0.72	≧1.43	
		Chemical Resistance		≧0.58	≧0.58	≧0.58	≧1.14	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧200	≧150	N/A	N/A	JIS-C 6471 0.8mmR, 0.5kg
		T.D.						
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
		T.D.						
	Solder Float 10sec at 288℃ (550^0F)		--	Pass	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	75±10%	58±10%	88±10% 126±10%	105±10%	ThinFlex
	UL Flame 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.

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ThinFlex

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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:

K - 10 10 R S

Product	Thickness of PI	Thickness of Cu	Cu Type	Structure
K : 3-FCCL	05 : 0.5 mil 10 : 1.0 mil 20 : 2.0 mil	05 : 1/2 oz 10 : 1.0 oz	R : RA H : HTE	Single-sided Double-sided
Supply Size	S/S: W: 250/500 ± 2mm; L: 100 +2/-0 m (roll type) D/S: W: 250/500 ± 2mm; L: 50 +2/-0 m (roll type)			

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

ThinFlex®

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3. Constructions:

Single-Side

Copper foil
Epoxy Adhesive
Polyimide film

Double-Side

Copper foil
Epoxy Adhesive
Polyimide film
Epoxy Adhesive
Copper foil

4. Properties:

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
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧1.00	≧1.50	≧2.00	IPC-TM650 2.4.9
		Solder Float		≧1.00	≧1.50	≧2.00	
		After Temp. Cycling		≧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 0.8mmR, 0.5kg
		T.D.					
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
		T.D.					
	Solder Float 10sec at 288℃(550°F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	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			Unit	K-2005RS K-2005RD K-2005HS K-2005HD	K-2010RS K-2010RD K-2010HS K-2010HD	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧1.50	≧2.00	IPC-TM650 2.4.9
		Solder Float		≧1.50	≧2.00	
		After Temp. Cycling		≧1.50	≧2.00	
		Chemical Resistance		≧1.50	≧2.00	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	N/A	N/A	JIS-C 6471 0.8mmR, 0.5kg
		T.D.				
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
		T.D.				
	Solder Float 10sec at 288℃(550^{0}F)		--	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		Um	88±10% 126±10%	105±10% 160±10%	ThinFlex
	UL Flame Test		--	Applying	Applying	UL

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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.

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ThinFlex

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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:

T - 10 10 R S

Product	Thickness of PI	Thickness of Cu	Cu Type	Structure
T : 3-FCCL	05 : 0.5 mil 10 : 1.0 mil	02 : 1/5 oz 03 : 1/3 oz 05 : 1/2 oz 10 : 1.0 oz	R : RA E : ED H : HTE	Single-sided Double-sided
Supply Size	D/S: W: 250/500 ± 2mm; L: 100 +2/-0 m (roll type) S/S: W: 250/500 ± 2mm; L: 50 +2/-0 m (roll type)			

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

ThinFlex

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3. Constructions:

Single-Side

Copper foil
Epoxy Adhesive
Polyimide film

Double-Side

Copper foil
Epoxy Adhesive
Polyimide film
Epoxy Adhesive
Copper foil

4. Properties:

Test item			Unit	T-0502ES	T-0503ES	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.72	≧0.72	IPC-TM650 2.4.9
		Solder Float		≧0.62	≧0.62	
		After Temp. Cycling		≧0.72	≧0.72	
		Chemical Resistance		≧0.58	≧0.58	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧150	≧150	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧150	≧150	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
		T.D.				
	Solder Float 10sec at 288℃ (550°F)		--	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	36±10%	39±10%	ThinFlex
	UL Flame Class		--	94V-0	94V-0	UL

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

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Test item			Unit	T-0505RS	T-0505RD T-0505HD	Test Method
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.72	≧0.72	IPC-TM650 2.4.9
		Solder Float		≧0.62	≧0.62	
		After Temp. Cycling		≧0.72	≧0.72	
		Chemical Resistance		≧0.58	≧0.58	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧250	≧200	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧250	≧200	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
		T.D.				
	Solder Float 10sec at 288℃(550^{0}F)		--	Pass	Pass	IPC-TM650 2.4.13
	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
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧0.72	≧0.72	≧0.72	IPC-TM650 2.4.9
		Solder Float		≧0.62	≧0.62	≧0.62	
		After Temp. Cycling		≧0.72	≧0.72	≧0.72	
		Chemical Resistance		≧0.58	≧0.58	≧0.58	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧150 ≧75	≧150	≧120	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧150 ≧75	≧150	≧120	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
		T.D.					
	Solder Float 10sec at 288℃(550°F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness 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
Mechanical Properties	Peel Strength	As Received	Kgf/cm	≧1.43	≧1.43	≧1.43	IPC-TM650 2.4.9
		Solder Float		≧1.25	≧1.25	≧1.25	
		After Temp. Cycling		≧1.43	≧1.43	≧1.43	
		Chemical Resistance		≧1.14	≧1.14	≧1.14	IPC-TM650 2.3.2
	Flexural Endurance	M.D.	Times	≧150	≧120	≧150	JIS-C 6471 0.8mmR, 0.5kg
		T.D.		≧150	≧120	≧150	
Electrical Properties	Surface Resistance		Ω	≧1.0×10^{11}	≧1.0×10^{11}	≧1.0×10^{11}	IPC-TM650 2.5.17
	Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	≧1.0×10^{12}	
	Insulation Resistance		Ω	≧1.0×10^{9}	≧1.0×10^{9}	≧1.0×10^{9}	IPC-TM650 2.6.3.2
Physical and Thermal Properties	Dimensional Stability	M.D.	%	-0.2~0.2	-0.2~0.2	-0.2~0.2	IPC-TM650 2.2.4C
		T.D.					
	Solder Float 10sec at 288℃(550°F)		--	Pass	Pass	Pass	IPC-TM650 2.4.13
	Thickness of total		um	80±10% 135±10%	80±10% 135±10%	80±10% 135±10%	ThinFlex
	UL Flame Class		--	94V-0	94V-0	94V-0	UL

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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

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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
Adhesive	Type	Epoxy Resin	
	Thickness	25 μm	13 μm
Supply Size		W: 250/500±2mm L: 100+2/-0m (roll type)	

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

ThinFlex

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3. Construction:

Release film
Epoxy Adhesive
Polyimide film
Epoxy Adhesive
Release paper

4. Properties:

Test item		Unit	KB-1010 KB-2005	Test Method
Peel Strength	As Received	Kgf/cm	≧2.00	IPC-TM650 2.4.9
	After Soldering		≧2.00	
Surface Resistance		Ω	≧1.0x10^{10}	IPC-TM650 2.5.17
Volume Resistance		Ω-cm	≧1.0x10^{12}	
Dimensional Stability	MD	%	-0.2~0.2	IPC-TM650 2.2.4
	TD			
Thickness Tolerance (w/o Release Paper)		%	±10	ThinFlex Method
Resin Flow		um	≦150	ThinFlex Method

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

ThinFlex

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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^2
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^2
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.

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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	1.0 mil	1.0 mil	1.0 mil
Adhesive	Type	Epoxy Resin			
	Thickness	25 μm	25 μm	30 μm	50 μm
Supply Size		W: 250/500±2mm, L: 100+2/-0m (roll type)			

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

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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
Peel Strength	As Received	Kgf/cm	≧1.43	IPC-TM650 2.4.9
	After Soldering		≧1.43	
Surface Resistance		Ω	≧$1.0x10^{10}$	IPC-TM650 2.5.17
Volume Resistance		Ω-cm	≧$1.0x10^{12}$	
Dimensional Stability	MD	%	-0.2~0.2	IPC-TM650 2.2.4
	TD			
Thickness Tolerance (w/o Release Paper)		%	±10	ThinFlex Method
Resin Flow		um	≦200	ThinFlex Method

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

ThinFlex

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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^2
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^2
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˚C.

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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:

Item		R-0005	R-0006	R-0010	R-0014	R-0020
Adhesive	Type	Halogen-Free Epoxy Resin				
	Thickness	13 μm	15 μm	25 μm	35 μm	50 μm
Supply Size		W: 250/500 ± 2mm, L: 100 +2/-0m (roll type)				

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

ThinFlex

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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 Strength	As Received	Kgf/cm	≧0.60	IPC-TM650 2.4.9
	After Soldering		≧0.60	
Thickness		um	±10%	ThinFlex
Adhesive Color		--	Light-Yellow	ThinFlex
Resin Flow		um	≤ 100	ThinFlex

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

ThinFlex

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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 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^2
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.

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ThinFlex-U
Bonding Sheet
(Halogen Free)

ThinFlex-U is an adhesive sheet coated on release paper with flame retardant modified halogen-free 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		U-0005	U-0006	U-0010	U-0020
Adhesive	Type	Halogen-Free Acrylic Resin			
	Thickness	13 μm	15 μm	25 μm	50 μm
Supply Size		W: 250/500±2mm, L: 100+2/-0m (roll type)			

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

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3. Construction:

Halogen-free acrylic adhesive
Release paper

4. Properties:

Test item		Unit	U-0005 U-0006	U-0010 U-0020	Test Method
Peel Strength	As Received	Kgf/cm	≧0.71	≧1.43	IPC-TM650 2.4.9
	After Soldering		≧0.71	≧1.43	
Solder Float 288℃-30sec		--	No Delaminate and Blister	No Delaminate and Blister	ThinFlex
Thickness		um	13±10% 15±10%	25±10% 50±10%	ThinFlex
Adhesive Color		--	Milk-White	Milk-White	ThinFlex
Resin Flow		um	≤150	≤150	ThinFlex

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

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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 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^2
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˚C.

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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:

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

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

ThinFlex

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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 Strength	As Received	Kgf/cm	≧1.50	≧2.00	IPC-TM650 2.4.9
	After Soldering		≧1.50	≧2.00	
Thickness Tolerance		%	±10%	±10%	ThinFlex

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

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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 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.

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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

2. Specifications:

Item		I-0505 I-0507 I-0508 I-0510	I-1005 I-1010 I-1014 I-1020
Polyimide Film Thickness		0.5 mil	1.0 mil
Adhesive	Type	Epoxy resin	
	Thickness	13 μm 18 μm 20 μm 25 μm	13 μm 25 μm 35 μm 50 μm
Supply Size		W: 250/500±2mm, L: 100+2/-0m (roll type)	

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

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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 Strength	As Received	Kgf/cm	≧0.71	≧1.43	IPC-TM650 2.4.9
	After Soldering		≧0.71	≧1.43	
Surface Resistance		Ω	≧1.0×10^{10}	≧1.0×10^{10}	IPC-TM650 2.5.17
Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
Resin Flow		μ m	≦200	≦200	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		--	94V-0	94V-0	UL

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

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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^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-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˚C.

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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:

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

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

ThinFlex

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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 Strength	As Received	Kgf/cm	≧0.60	≧0.70	IPC-TM650 2.4.9
	After Soldering		≧0.60	≧0.70	
Surface Resistance		Ω	≧1.0×10^{10}	≧1.0×10^{10}	IPC-TM650 2.5.17
Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
Resin Flow		μ 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

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

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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 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.

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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:

Item		Q-0505 Q-0506 Q-0508 Q-0510 Q-0514	Q-1010 Q-1014 Q-1020
Polyimide Film Thickness		0.5 mil	1.0 mil
Adhesive	Type	Epoxy resin	
	Thickness	13 μm 15 μm 20 μm 25 μm 35 μm	25 μm 35 μm 50 μm
Supply Size		W: 250/500 ± 2mm, L: 100 +2/-0m (roll type)	

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

ThinFlex

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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 Strength	As Received	Kgf/cm	≧0.70	≧1.00	IPC-TM650 2.4.9
	After Soldering		≧0.70	≧1.00	
Surface Resistance		Ω	≧1.0×10^{10}	≧1.0×10^{10}	IPC-TM650 2.5.17
Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
Resin Flow		μ 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		--	94V-0	94V-0	UL

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

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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 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.

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ThinFlex®

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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:

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

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

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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 Strength	As Received	Kgf/cm	≧0.60	≧0.90	IPC-TM650 2.4.9
	After Soldering		≧0.60	≧0.90	
Surface Resistance		Ω	≧1.0×10^{10}	≧1.0×10^{10}	IPC-TM650 2.5.17
Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
Resin Flow		μ m	≦200	≦200	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		--	94V-0	94V-0	UL

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

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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 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^2
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.

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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:

Item		KA-0505 KA-0506 KA-0507 KA-0510	KA-1005 KA-1010 KA-1014 KA-1020	KA-2014
Polyimide Film Thickness		0.5 mil	1.0 mil	2.0 mil
Adhesive	Type	Epoxy resin		
	Thickness	13 μm 15 μm 18 μm 25 μm	13 μm 25 μm 35 μm 50 μm	35 μm
Supply Size		W: 250/500±2mm, L: 100+2/-0m (roll type)		

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

ThinFlex

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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	≧1.0×10^{10}	≧1.0×10^{10}	IPC-TM650 2.5.17
Volume Resistance		Ω-cm	≧1.0×10^{12}	≧1.0×10^{12}	
Resin Flow		μ 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

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

ThinFlex

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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^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.

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