

THERMAL CONTROL FILMS

VACUUM DEPOSIT FILMS

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MLIs



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PRODUCTS LINEUP

Polyimide Films : 宇宙用ポリイミドフィルム

TYPE	DESCRIPTION / PARTS No.		
NANN	One-Side Aluminized Polyimide Film size: 1016mm width x 50m		
		UTC-012S-NANN	12µm UPILEX S / Aluminum
		UTC-025R-NANN	25µm UPILEX R / Aluminum
		UTC-050R-NANN	50µm UPILEX R / Aluminum
AANN	Both-Side Aluminized Polyimide Film size: 1016mm width x 50m		
		UTC-012S-AANN	Aluminum / 12µm UPILEX S / Aluminum
		UTC-025R-AANN	Aluminum / 25µm UPILEX R / Aluminum
		UTC-050R-AANN	Aluminum / 50µm UPILEX R / Aluminum
TANN	ITO Polyimide Film size: 508mm width x 50m		
	UTC-050R-TANN	I.T.O. / 50µm UPILEX R / Aluminum	
	Both-Side Aluminized Polyimide Film size: 1016mm width x 50m		
AAEN		UTC-012S-AAEN-H	Aluminum / 12µm Polyimide Hot Embossed / Aluminum
		UTC-012S-AAEN	Aluminum / 12µm Polyimide Embossed / Aluminum

Polyimide Film Tapes : 宇宙用ポリイミドフィルムテープ

TYPE	DESCRIPTION / PARTS No.		
NANA	One-Side Aluminized Polyimide Film Tape size: 12.5mm or 25mm width x 25m		
		UTC-025R-NANA	25µm UPILEX R / Aluminum
		UTC-050R-NANA	50µm UPILEX R / Aluminum
ANNA	Both-Side Aluminized Polyimide Film Tape size: 12.5mm or 25mm width x 25m		
		UTC-025R-ANNA	Aluminum / 25µm UPILEX R / Aluminum
		UTC-050R-ANNA	Aluminum / 50µm UPILEX R / Aluminum
TANA	ITO Polyimide Film Tape size: 12.5mm or 25mm width x 25m		
	UTC-050R-TANA	I.T.O. / 50µm UPILEX R / Aluminum	

Polyester (PET) Films : 宇宙用ポリエステルフィルム

TYPE	DESCRIPTION / PARTS No.		
AANN	Both-Side Aluminized PET Film size: 1016mm width x 50m (006P・025P) 1000mm width x 50m (012P)		
		UTC-006P-AANN	Aluminum / 6µm Polyester / Aluminum
		UTC-012P-AANN	Aluminum / 12µm Polyester / Aluminum
		UTC-025P-AANN	Aluminum / 25µm Polyester / Aluminum
AAEN	Both-Side Aluminized PET Embossed Film size:1016mm width x 100m (006P) size:1000mm width x 100m (012P)		
		UTC-006P-AAEN	Aluminum / 6µm Polyester Embossed / Aluminum
		UTC-012P-AAEN	Aluminum / 12µm Polyester Embossed / Aluminum

Cryogenic Polyester (PET) Films : 極低温用ポリエステルフィルム

TYPE	DESCRIPTION / PARTS No.		
AANN	Both-Side Aluminized PET Film size: 1000mm width x 50m ~		
	OSI-012P-AANN	Aluminum / 12µm Polyester / Aluminum	
	Both-Side Aluminized PET Film with Nonwoven PET Fabric size: 50mm width x 50m~1000mm		
AAFN		OSI-012P-AAFN	Aluminum / 12µm Polyester / Aluminum +Nonwoven PET fabric
AAFN5-ROLL		ROLL Sectional construction size: 1000mm width x 10m	
	OSI-012P-AAFN5-RL	(Aluminum / 12µm Polyester / Aluminum +Nonwoven PET fabric)×5-ROLL	

INITIAL CHARACTERISTICS

Optical Properties

Surface	P/No.	Absorptance Alfa _s	Emittance ε _n
Polyimide	UTC-012R-NANN	0.31	0.47
	UTC-025R-NANN	0.32	0.65
	UTC-050R-NANN	0.37	0.73
	UTC-075R-NANN	0.43	0.82
Aluminum	UTC-025R-AANN	0.10	0.03
I.T.O.	UTC-012R-TANN	0.33	0.49
	UTC-125R-TANN	0.50	0.50

Mechanical Properties

Surface	P/No.	Tensile Strength MPa	Tensile Elongation %
I.T.O.	UTC-012R-TANN	320	210
Polyimide	UTC-025R-NANN	330	160
Polyimide	UTC-075R-NANN	340	140
I.T.O.	UTC-125R-TANN	320	120

Outgassing Data

Surface	P/No.	TML, %	CVCM %
Polyimide	UTC-025R-NANN	0.21	0.01
	UTC-075R-NANN	0.54	0.01
Aluminum	UTC-012R-AANN	0.68	0.01
	UTC-125R-AANN	0.82	0.01
I.T.O.	UTC-012R-TANN	0.60	0.08
	UTC-125R-TANN	0.80	0.01

After endurance test characteristics

U. V. IRRADIATION TESTS

Absorptance, α_s

Surface	P/No.	Initial Value	300days	1000days
Polyimide	UTC-025R-NANN	0.32	0.34	0.32
	UTC-075R-NANN	0.43	0.43	0.43
Aluminum	UTC-012R-AANN	0.10	0.10	0.12
I.T.O.	UTC-012R-TANN	0.33	0.37	0.35
	UTC-125R-TANN	0.50	0.53	0.52

Emittance, ε_n

Surface	P/No.	Initial Value	300days	1000days
Polyimide	UTC-025R-NANN	0.65	0.66	0.65
	UTC-075R-NANN	0.82	0.82	0.82
Aluminum	UTC-012R-AANN	0.03	0.04	0.04
I.T.O.	UTC-012R-TANN	0.49	0.49	0.52
	UTC-125R-TANN	0.50	0.50	0.52

Tensile Strength (MPa)

Surface	P/No.	Initial Value	300days
I.T.O.	UTC-012R-TANN	320	300
Polyimide	UTC-025R-NANN	330	350
Polyimide	UTC-075R-NANN	340	350
I.T.O.	UTC-125R-TANN	320	340

Tensile Elongation (%)

Surface	P/No.	Initial Value	300days
I.T.O.	UTC-012R-TANN	210	260
Polyimide	UTC-025R-NANN	160	200
Polyimide	UTC-075R-NANN	140	170
I.T.O.	UTC-125R-TANN	120	180

After endurance test characteristics

ELECTRON IRRADIATION TESTS

Absorptance, α_s

Surface	P/No.	Initial	500keV	1400keV
			1.4E16 e/cm ²	1.4E17 e/cm ²
Polyimide	UTC-025R-NANN	0.32	0.34	0.32
	UTC-075R-NANN	0.43	0.43	0.43
Aluminum	UTC-012R-AANN	0.10	0.10	0.12
I.T.O.	UTC-012R-TANN	0.33	0.37	0.35
	UTC-125R-TANN	0.50	0.53	0.52

Emittance, ε_n

Surface	P/No.	Initial	500keV	1400keV
			1.4E16 e/cm ²	1.4E17 e/cm ²
Polyimide	UTC-025R-NANN	0.65	0.66	0.68
	UTC-075R-NANN	0.80	0.82	0.83
Aluminum	UTC-012R-AANN	0.03	0.03	0.03
I.T.O.	UTC-012R-TANN	0.49	0.48	0.49
	UTC-125R-TANN	0.50	0.49	0.54

Tensile Strength (MPa)

Surface	P/No.	Initial	500keV	1400keV
			1.4E16 e/cm ²	1.4E17 e/cm ²
I.T.O.	UTC-012R-TANN	320	220	230
Polyimide	UTC-025R-NANN	330	310	240
Polyimide	UTC-075R-NANN	340	250	290
I.T.O.	UTC-125R-TANN	320	260	240

Tensile Elongation (%)

Surface	P/No.	Initial	500keV	1400keV
			1.4E16 e/cm ²	1.4E17 e/cm ²
I.T.O.	UTC-012R-TANN	210	140	140
Polyimide	UTC-025R-NANN	160	140	110
Polyimide	UTC-075R-NANN	140	90	100
I.T.O.	UTC-125R-TANN	120	100	80

Electrical Resistance (I.T.O, ohm/sq.)

Surface	P/No.	Initial	500keV	1400keV
			1.4E16 e/cm ²	1.4E17 e/cm ²
I.T.O.	UTC-012R-TANN	77.31	74.88	74.15
	UTC-125R-TANN	71.98	75.62	76.55

After endurance test characteristics

THERMAL CYCLING TESTS

Absorptance, α_s

Surface	P/No.	Initial	180deg-C \leftrightarrow 200deg-C	
			250 cycles	1000 cycles
Polyimide	UTC-025R-NANN	0.32	0.33	0.32
	UTC-075R-NANN	0.43		0.43
Aluminum	UTC-012R-AANN	0.10	0.10	0.10
I.T.O.	UTC-012R-TANN	0.33	0.36	0.35
	UTC-125R-TANN	0.50		0.52

Emittance, ε_n

Surface	P/No.	Initial	180deg-C \leftrightarrow 200deg-C	
			250 cycles	1000 cycles
Polyimide	UTC-025R-NANN	0.65	0.65	0.65
	UTC-075R-NANN	0.82		0.80
Aluminum	UTC-012R-AANN	0.03	0.03	0.03
I.T.O.	UTC-012R-TANN	0.49	0.52	0.58
	UTC-125R-TANN	0.50		0.60

Tensile Strength (MPa)

Surface	P/No.	Initial	180deg-C \leftrightarrow 200deg-C	
			250 cycles	1000 cycles
I.T.O.	UTC-012R-TANN	320	260	300
Polyimide	UTC-025R-NANN	330	300	330
Polyimide	UTC-075R-NANN	340		270
I.T.O.	UTC-125R-TANN	320		270

Tensile Elongation (%)

Surface	P/No.	Initial	180deg-C \leftrightarrow 200deg-C	
			250 cycles	1000 cycles
I.T.O.	UTC-012R-TANN	210	170	190
Polyimide	UTC-025R-NANN	160	140	160
Polyimide	UTC-075R-NANN	140		110
I.T.O.	UTC-125R-TANN	120		110

Electrical Resistance (I.T.O, ohm/sq.)

Surface	P/No.	Initial	180deg-C \leftrightarrow 200deg-C	
			250 cycles	1000 cycles
I.T.O.	UTC-012R-TANN	80	360	250

After endurance test characteristics

HIGH TEMPERATURE AGING TESTS

Measurement Standard: ASTM D 882

Tensile Strength (MPa)

Surface	P/No.	Initial	225deg-C	200deg-C	
			1000hrs	4000hrs	10000hrs
I.T.O.	UTC-012R-TANN	320	250	290	298
Polyimide	UTC-025R-NANN	330	310	290	326
Polyimide	UTC-075R-NANN	340		300	300
I.T.O.	UTC-125R-TANN	320		290	314

Tensile Elongation (%)

Surface	P/No.	Initial	225deg-C	200deg-C	
			1000hrs	4000hrs	10000hrs
I.T.O.	UTC-012R-TANN	210	160	190	195
Polyimide	UTC-025R-NANN	160	150	140	158
Polyimide	UTC-075R-NANN	140		120	116
I.T.O.	UTC-125R-TANN	120		110	119

LOW TEMPERATURE (LN2) AGING TESTS

Measurement Standard: ASTM D 882

Tensile Strength (MPa)

Surface	P/No.	Initial	-196deg-C		
			1000hrs	4000hrs	10000hrs
I.T.O.	UTC-012R-TANN	320	310	300	270
Polyimide	UTC-025R-NANN	330	340	320	310
Polyimide	UTC-075R-NANN	340	360	340	290
I.T.O.	UTC-125R-TANN	320	330	320	260

Tensile Elongation (%)

Surface	P/No.	Initial	-196deg-C		
			100hrs	200hrs	3000hrs
I.T.O.	UTC-012R-TANN	210	190	190	180
Polyimide	UTC-025R-NANN	160	160	160	160
Polyimide	UTC-075R-NANN	140	130	130	120
I.T.O.	UTC-125R-TANN	120	120	120	100

Polyester (PET) Film

UTC-006P-AANN (Film Thickness: 6 μ m)

Properties		Measurement Value	Spec.
Optical Character	Absorptance α_s	0.091~0.115	<0.25
	Emittance Epsilon _n	0.023~0.036	<0.10
Electrical Resistance	Ohm/sq.	0.69~0.91	<1.0
Mechanical Properties	Tensile Strength (Mpa)	234	>100
	Elongation (%)	71	>50
	Unit Mass (g/m ²)	8.97	<11.3

UTC-012P-AANN (Film Thickness: 12 μ m)

Properties		Measurement Value	Spec.
Optical Character	Absorptance α_s	0.091~0.115	<0.25
	Emittance ϵ_n	0.023~0.036	<0.10
Electrical Resistance	Ohm/sq.	0.69~0.91	<1.0
Mechanical Properties	Tensile Strength (Mpa)	232	>100
	Elongation (%)	95	>50
	Unit Mass (g/m ²)	17.4	<21.6
Outgassing	TML (%)	0.173	<1.0
	CVCM (%)	0.046	<0.1
	WVR	0.025	-

UTC-025P-AANN (Film Thickness: 25 μ m)

Properties		Measurement Value	Spec.
Optical Character	Absorptance α_s	0.072~0.090	<0.25
	Emittance ϵ_n	0.021~0.030	<0.10
Electrical Resistance	Ohm/sq.	0.39~0.71	<1.0
Mechanical Properties	Tensile Strength (Mpa)	192	>100
	Elongation (%)	171	>50
	Unit Mass (g/m ²)	32.4	<42.2

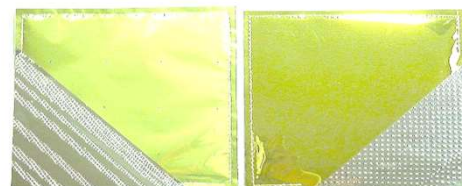
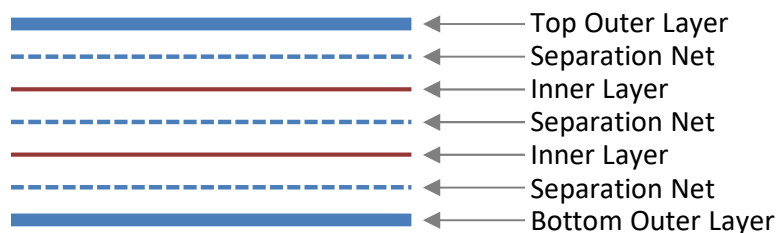
Polyester (PET) Net

UTC-P-01 (Polyester Net)

Properties		Measurement Value	Spec.
Mechanical Properties	Thickness (um)	143~170	140~190
	No. of Mesh / cm2	7.4~8.0	6.6~9.2
	Unit Mass (g/m2)	6.7	<7.1
	Tensile Strength (Kgf/50mm)	4.2~6.9	>1
	Elongation (%)	16-22	>15
Outgassing	TML (%)	0.173	<1.0
	CVCM (%)	0.046	<0.1
	WVR	0.025	-

Standard MLIs

MLI Sectional construction



Standard MLI Type (Size: 500mm x 500mm, 1000mm x 1000mm)

Outer Layer Materials	TYPE	Layers	Film No.	No. of Layers
Polyimide	A	Top Outer Layer Film	UTC-025R-NANN	1
		Separation Net	UTC-P-01	9
		Inner Layer Film	UTC-006P-AANN	8
		Bottom Outer Layer Film	UTC-025R-AANN	1
	B	Top Outer Layer Film	UTC-025R-NANN	1
		Separation Net	UTC-P-01	11
		Inner Layer Film	UTC-006P-AANN	10
		Bottom Outer Layer Film	UTC-025R-AANN	1
	C	Top Outer Layer Film	UTC-025R-AANN	1
		Separation Net	UTC-P-01	9
		Inner Layer Film	UTC-006P-AANN	8
		Bottom Outer Layer Film	UTC-025R-AANN	1
D	Top Outer Layer Film	UTC-025R-AANN	1	
	Separation Net	UTC-P-01	11	
	Inner Layer Film	UTC-006P-AANN	10	
	Bottom Outer Layer Film	UTC-025R-AANN	1	
Polyester	E	Top Outer Layer Film	UTC-025P-AANN	1
		Separation Net	UTC-P-01	9
		Inner Layer Film	UTC-006P-AANN	8
		Bottom Outer Layer Film	UTC-025P-AANN	1
	F	Top Outer Layer Film	UTC-025P-AANN	1
		Separation Net	UTC-P-01	11
		Inner Layer Film	UTC-006P-AANN	10
		Bottom Outer Layer Film	UTC-025P-AANN	1

The other configuration, shape & size are also available. Please contact: info.oe@tech.orbital-e.co.jp