

# Copper Foil for Fine Patterning

## PF-EL

Profile-Free Copper Foil is Suitable for Fine line Patterning with Surface Roughness 1.0~2.0 $\mu\text{m}$ (adhesive side).

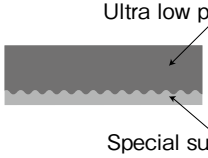
### ■ Features

- PF-EL is a copper foil that is appropriate for fine line patterning with semi-additive process(SAP) using rough shapes of primer made with the copper profile.
- PF-EL has high peel strength for plating copper.
- High flexural modulus substrates with using prepregs.

### ■ Applications

- Semiconductor package substrates
- High density multi-layer PWB

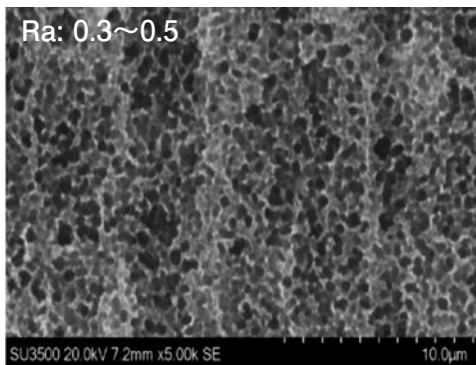
### ■ Standard Specifications

Part Number	Copper Foil Thickness( $\mu\text{m}$ )	Special Surface Treatment( $\mu\text{m}$ )	Roughness( $\mu\text{m}$ )	Composition	Process
PF-EL-12	12	4	Ra: 0.3~0.4 Rz: 1.5~2.5	 <p>Ultra low profile copper foil Special surface treatment</p>	SAP* <sup>1</sup>
PF-EL-3	3	2, 4	Ra: 0.3~0.5 Rz: 1.5~2.5		SAP* <sup>1</sup> MSAP* <sup>2</sup>
PF-EL-2	2	2, 4	Ra: 0.3~0.5 Rz: 1.5~2.5		
PF-EL-1.5	1.5	2	Ra: 0.3~0.5 Rz: 1.5~2.5		
PF-EL-1.5SP	1.5	2	Ra: 0.2~0.3 Rz: 1.5~2.5		

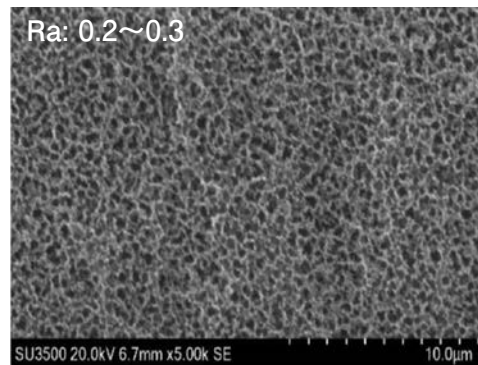
※1) After lamination of the material to the prepreg, the copper foil is etched out, and the special surface treatment with appropriate roughness made by a replica of the copper profile etched out remains on prepreg surface. This process is SAP using this replica.

※2) Semi additive process using thin copper foil as seed layer for having E' less copper + copper on both patterning and via plating purpose.

### ■ Surface

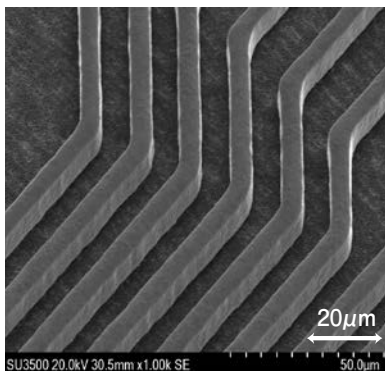


PF-EL

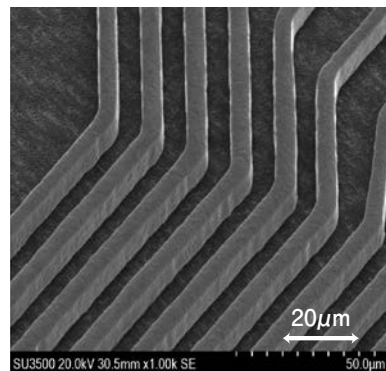


PF-EL SP

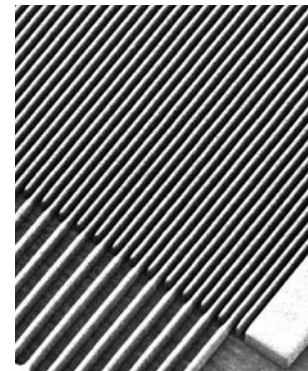
### ■ Fine patterning with SAP



Design  
L/S=10/10 $\mu\text{m}$  with PF-EL  
(Exposure LDI)

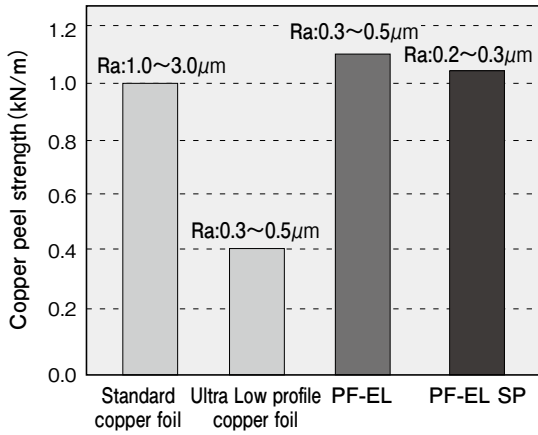


Design  
L/S=7/7 $\mu\text{m}$  with PF-EL SP  
(Exposure LDI)



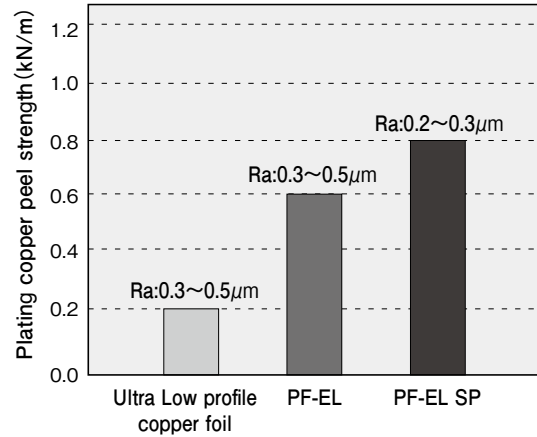
Design  
L/S=5/5 $\mu\text{m}$  with PF-EL SP  
(Exposure Stepper)

■ Copper peel strength



※MCL-E-770G Type(R), Copper foil 1.5µm with plating copper 20µm

■ Plating copper peel strength



※MCL-E-770G Type(R), plating copper thickness 20µm

■ Fine patterning process

