

# CU Mesh Shielding Film

Learn everything  
about this  
shielding  
technology

# Summary

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What is the CU Mesh  
film technology ?

**1**

ITO vs Cu Mesh

**7**

Which applications ?

**10**

Conclusion

**17**

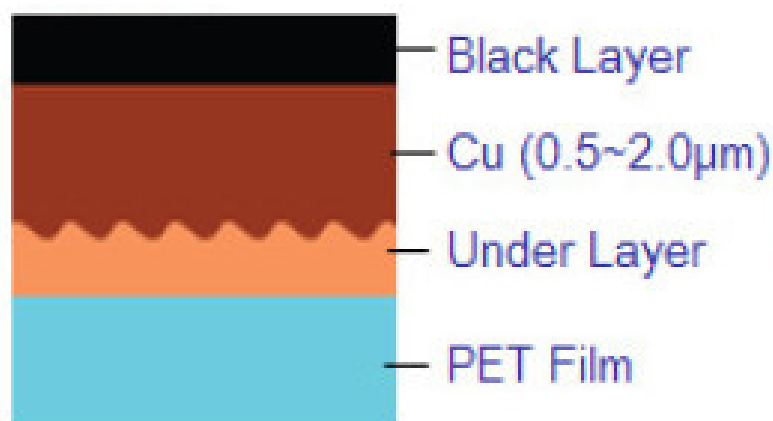
# 1

## What is the CU Mesh film technology ?

The most commonly used technology is **ITO**. This technology has several cons like a high price, lower shielding effectiveness & lower resistance (lifetime, oxydation).

That's why we developed an alternative product, allowing a high shielding effectiveness & resistance : the transparent **Cu mesh film**.

This EMC shielding technology allows an electrical conductivity on **wide surfaces**.



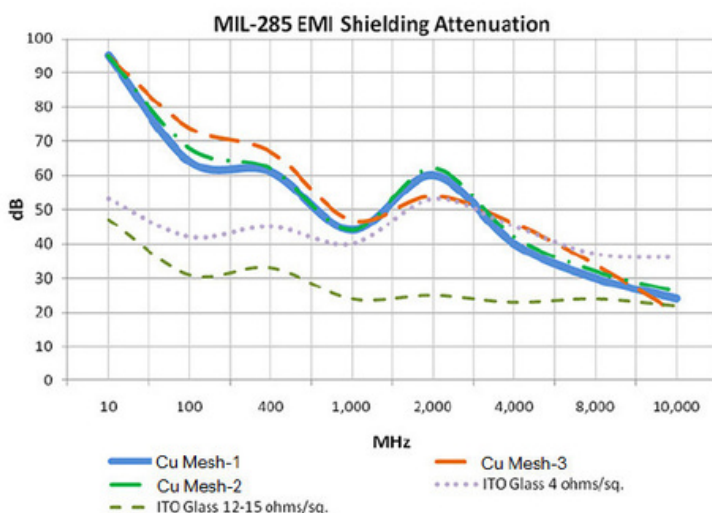
A very thin metallic wire mesh (copper) is moulded, stick or **laminated** on a transparent support.




EMI/RF Shielding windows provide efficient electromagnetic shielding and an optimal transparency (**Visible light transmittance >80%**).

The copper surface is also treated to ensure the copper's anti-oxidation over time.

This EMI and RF shielding film is especially fitting for **automotive** and **military** projects. This EMI film is also widely used on connected equipment and IoT. For example the Cu Mesh Film is used to shield against EMI a window on a RFID cabinet (UHF).

Being photo-etched, this shielding film has a low surface resistance (**0.25Ω/square**).



#	Cu Mesh-1	Cu Mesh-2	Cu Mesh-3
Line Width	8µm	10µm	25µm
Pitch	300µm	300µm	300µm
Opening	95%	93%	83%
Appearance			
Transmission	87%	85%	75%
Surface Resistance	0.25Ω/□	0.25Ω/□	0.10Ω/□

# Which type of film for which shielding effectiveness ?

There are **3 main types of film**, each of them has their own performances & technical characteristics :

item		unit	Performance Index			Detection Method	Remark
			COMT 100	MFLP	MFHP		
Thickness	Protective film	μm	50~60			ASTM D374	Material:PE
	Transparent conductive film	μm	100±5				Material:PET
	Adhesive	μm	20±5				Optical pressure sensitive adhesive
	Release liner	μm	38±5				Material:PET
Mesh shape			square 45 degree grid				
Mesh width		μm	17	17	21		
Mesh spacing		μm	238	143	255		
Visible light transmittance		%	≥80	≥75	≥81	GB/T 2410-2008	
Surface resistance (conductive side)		W/□	≤0.2	≤0.2	0.1	Four probe surface resistance tester	
Adhesion (conductive side)			At least reach grade 2			GB/T 9286-1998	
Adhesive peel strength		g/25mm	≥100			GB/T 2792-1998	For glass panel
Wet-heat resistant property	Resistance variation	%	≤30			65℃、90%	ΔR/R0
	Light transmittance change	%	≤5			100hours	ΔT/T0

# MFHP

The MFHP reference is the EMI shielding film with the higher shielding performances. This reference of Cu Mesh film is used on RF projects requiring a **high level of EMI shielding**. For example to shield a **RFID** cabinet and to avoid that the tags outside of the cabinet are read by the antennas inside.

This EMI film is manufacture in roll of 1 500mm wide and several decade of meters. It also has an adhesive surface. This reference cannot be produced without the adhesive surface.

The roll can be cut on demand to fit to your formats.

**A4 sheets of this shielding film are available as samples.**

## MFLP


The MFLP reference have standard EMI shielding performance. The shielding performances and the lifetime of this Cu Mesh film are still much longer than **ITO technology**.

**A4 sheets of this shielding film are available as samples.**

This reference of **EMI/RF** shielding film is made on roll of 1 500mm without optical adhesive. An optical adhesive can be added on roll of 700mm wide.

The ground contact to the frame of the equipment can be done by a direct contact between the film and the metal. The **conductivity** of this Cu Mesh Film is high enough for this configuration. To compensate mechanical gap and to get a better EMI sealing, you can complete assemble this kind of window using **EMI** gaskets.

Model	Transmittance	Frequency										
		14K	100K	10M	30M	150M	450M	950M	1G	3G	6G	10G
COMT 100 770mm wide 100 OPI	>80%	8	9	32	41	66	51	47	47	35	31	26
MFHP Max 1500mm wide (150 OPI)	>75%	11	13	38	49	76	63	55	53	44	40	35
MFLP	≥81	8	9	30	40	63	50	45	45	35	30	25

(Want to know everything about EMC gaskets ? Then follow the link  [The ultimate guide to EMC gaskets](#)).



# 2 ITO vs Cu Mesh Film

ITO (for **Indium Tin Oxyde**) is the oldest technology when it comes to electromagnetic shielding transparent film.

Metallic particles are projected onto a PET surface, with a very thin thickness. The conductivity onto the surface of the film is ensured by these particles.

The ITO films have several disadvantages:











- **Resistivity** is really high compared to a Copper Mesh : >1000 Ohms/square
- The effective **oxidation protection** is really weak. After just a couple of years, the ITO film becomes yellow and/or is stained by fingerprints, because of the metallic particles being oxidized.

- ITO film's quality is variable. Prices depend on the **particles** & the process involved, without ensuring good results over time.
- TO film's **mechanical** strength is poor. This film is more likely to get scratched or broken during handling or application. Hence, the overall quality of the **EMC shielding** quality is impacted.

,That is why several studies nowadays show that Cu Mesh films are thriving, while **ITO market shares are regressing.**

[You can find an infographic on this phenomenon on on Fieldscale's website.](#)

**Quick & visual comparaison  
between the 2 technologies :**

	<b>ITO</b>	<b>CuMesh</b>
<b>Resistance</b>		
<b>Transparence</b>		
<b>Oxidation</b>		
<b>Conductivity</b>		
<b>Cost</b>		

# 3

## Which applications ?



**What are the fields in which the Cu mesh film can be used ?**

Cu Mesh film ensures a **shielding onto a surface** (usually where there is a need of high transparency).

Here are **6 key applications** to give an overview to you :

# Transparent EMC/EMI shielding film for a connected fridge(RFID) or a smart cabinet:

The transparent RF shielding film is laminated onto the EMC window, insuring **electromagnetic and radio-frequency-proofing** within the fridge or the cabinet.



**Ground contact** is made directly onto the film, against the frame. EMC gasket can also be used to compensate mechanical float when assembling.

Electromagnetic and radio-frequency waves are reflected and **conducted onto the film surface**, and then conducted to the grounded frame.

# Transparent EMC/EMI shielding film for a meeting room confidentiality:

EMC and RF shielding film ensures a **global phone or Wi-Fi waves' proofing** (shielding >40dB for frequencies from 10MHz to 10GHz). The room is thus completely **sealed** from electromagnetic and radio frequency waves, while allowing light to come in thanks to its transparency (>81% for visible light).

The shielding film is also infrared-proofed, protecting the room from thermal cameras.

The micro copper-mesh film can also be used for bigger projects, as to cover openings in buildings (windows or big glass surfaces) for example.



## Transparent EMC/EMI shielding film for medical devices security (CE certifications compliant):

The conductive film allows medical devices to be EMC-proofed. **Medical** monitors screen can thus be shielded so that they don't radiate electromagnetic interferences within the room. Patient security and surrounding devices **reliability** is thus ensured.



This EMC shielding film is also used to protect staff during medical imaging operations. Indeed, composed of a micro copper mesh, the film is de facto **electromagnetic waves proofed (such as X-ray)**.



## Transparent EMC shielding film for anechoic chambers (for the tests and EMC qualifications, to be CE compliant):



The EMC shielding film (Cu Mesh) allows the anechoic chambers' openings to be perfectly **EMC-** and **RF-proofed**. It completes the **anechoic** chamber by allowing the inside of the room to be visible from the outside, without back and forth pollution.



## **Transparent EMC shielding film for on-field military equipment's protection:**

On-field military forces can be detected thanks to radio-frequencies or **electromagnetic emissions**. Equipment brought on the field can radiate such waves. For the forces to be invisible, the equipment have to be perfectly EMC-proofed.

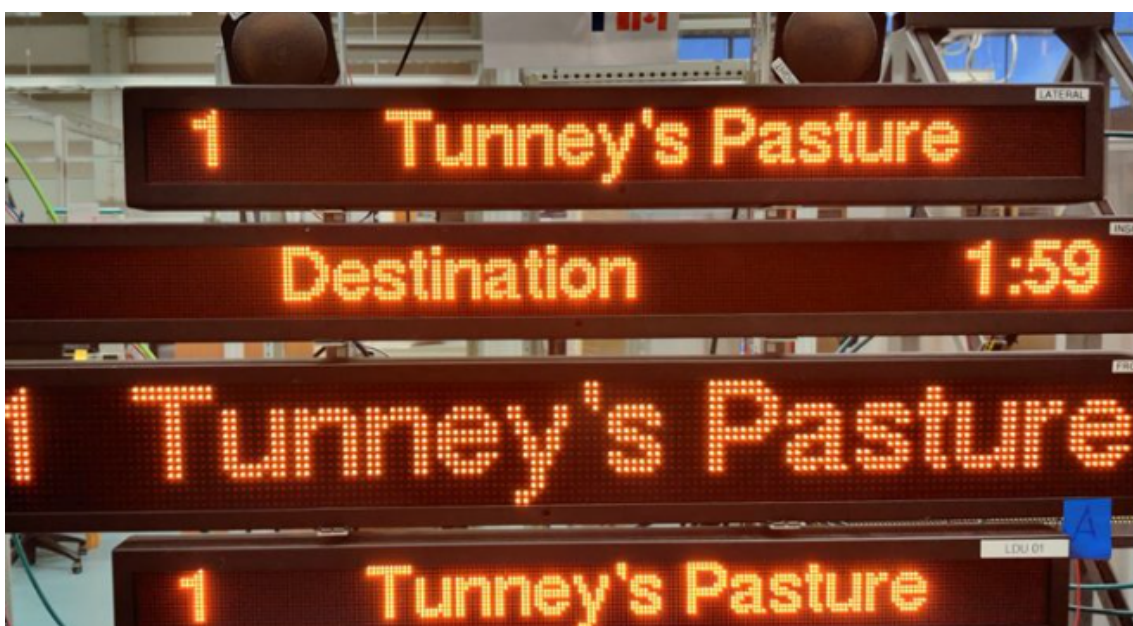
The **EMC** shielding film is laminated onto screens or armored vehicles' windows. With its high conductivity, it ensures the EMC and RF shielding of all openings, while ensuring a high transparency for the staff.

The shielding film is also **infrared-proofed**, making equipment totally invisible from thermal cameras while keeping its permeability to the visible spectrum waves.

# Transparent EMC shielding film for display screens electromagnetic certification:

This EMC shielding film is a valuable ally for the EMC standards and CE certification. Indeed, it is perfectly electromagnetic and radio-frequency-proofed, while having a high permeability of the visible spectrum (>81%).

That is why this shielding film is widely used in signal equipment or digital display.



# 4

## Conclusion



CU Mesh film is the main alternative to bad-aging technologies like **ITO**.

Thanks to its technical characteristics & its high transparency, the film (laminated onto a window or not) can fit to various projects : **industry, military, automotive, medical...**

To compensate mechanical gap and to get a better EMI sealing, you can complete assemble this kind of window using **soft EMI gaskets**.



**Want to know how to include  
this shielding film into your  
projects ?**

**I send a mail**

**I go on the chat**