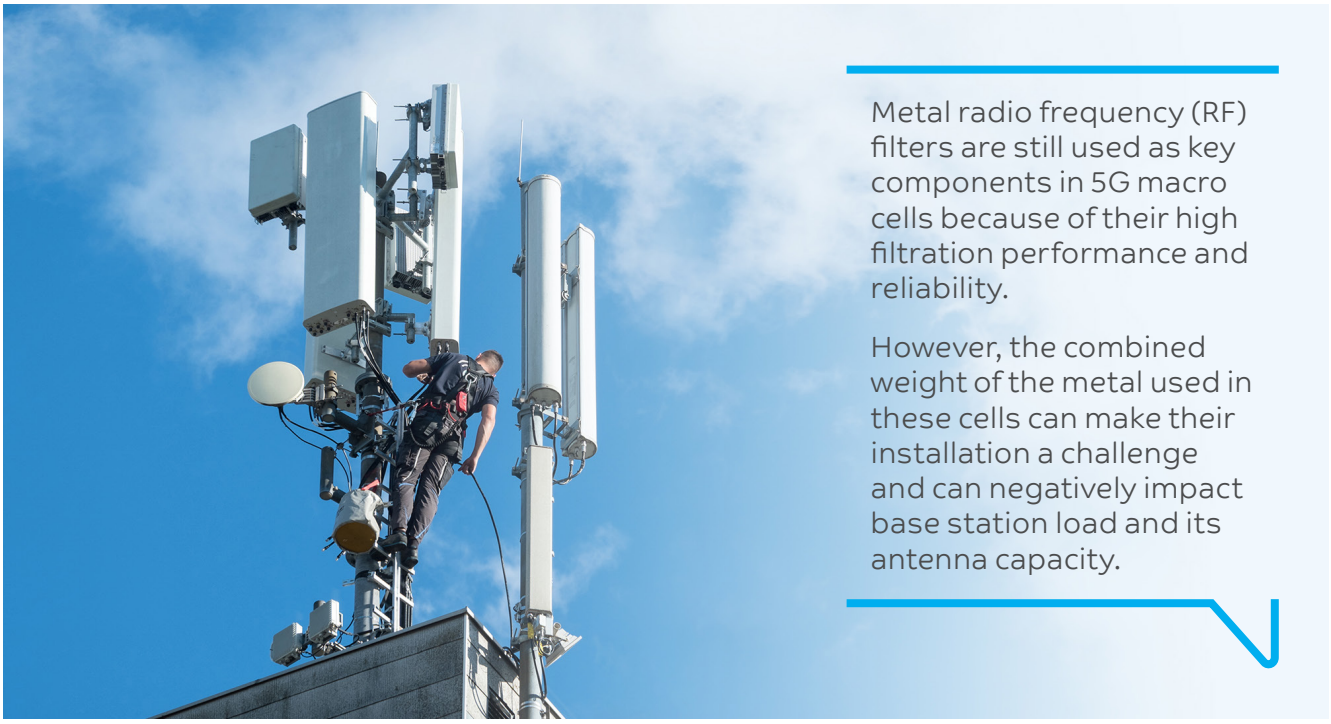
CHEMISTRY THAT MATTERS™

LIGHT-WEIGHT 5G MACRO CELLS AND INTEGRATED ANTENNA FILTER UNITS USING SABIC'S ULTEM™ 3473 RESIN



Metal radio frequency (RF) filters are still used as key components in 5G macro cells because of their high filtration performance and reliability.

However, the combined weight of the metal used in these cells can make their installation a challenge and can negatively impact base station load and its antenna capacity.

ULTEM 3473 resin is **40% lighter than aluminum** and a potential alternative for these RF filters thanks to its low CTE, Surface Mount Technology (SMT) process compatibility and excellent surface metallization performance.

INTEGRATED ANTENNA FILTER UNITS

ULTEM 3473 resin can also support the design of new integrated antenna filter units (AFUs), which cannot be achieved with metal. Using injection molding, the dipole antenna matrix and RF cavity filter body can be produced as one component. This approach simplifies production and may lead to cost reductions and additional weight savings.

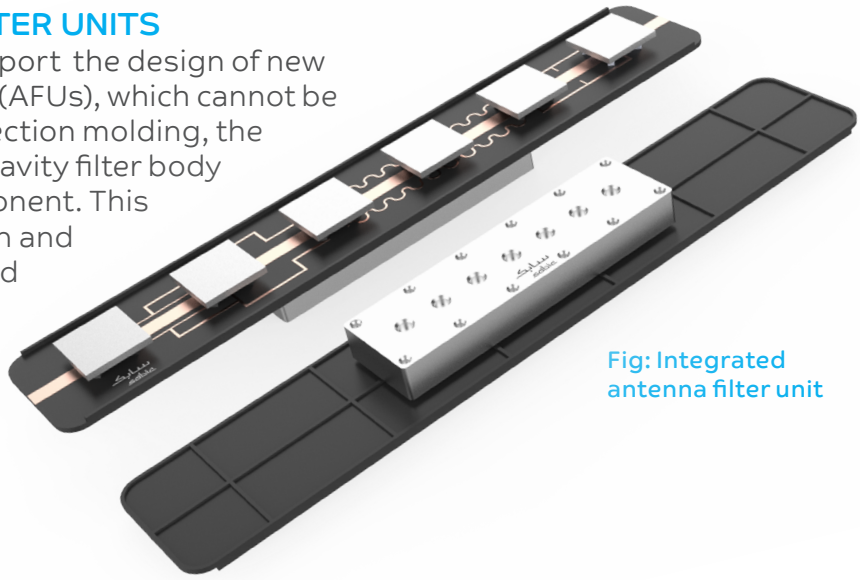


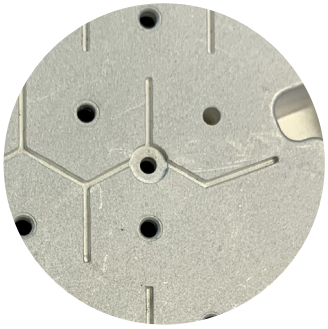
Fig: Integrated antenna filter unit

PERFORMANCE ADVANTAGES OF ULTEM™ 3473 RESIN

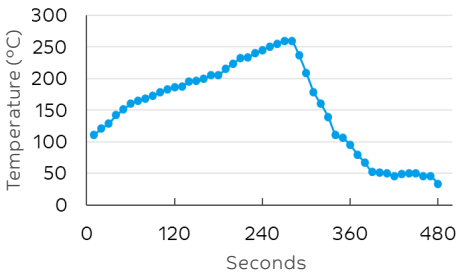
Weight reduction	Low specific gravity of -1.67, ~40% lighter than aluminum
Low temperature drift	Low CTE in broad range of temperature - close to aluminum
Low insertion loss	Easy plating with low Ra and excellent adhesion to metal
Low signal loss	Stable and low Dk/Df under different frequencies
Part integration	Injection molding supports new designs and ease of assembly
SMT compatible	Heat resistance up to 260°C for SMT assembly
Reduced production cycle time	Good flowability and low warpage

ULTEM 3473 RESIN IS COMPATIBLE WITH SMT TECHNOLOGY

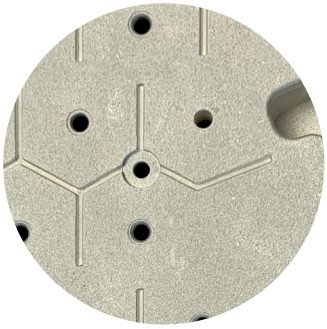
Thanks to improved Heat Deflection Temperature (HDT), ULTEM 3473 resin can withstand the 260°C peak temperatures in solder mount assembly.



Plated ULTEM resin part before SMT



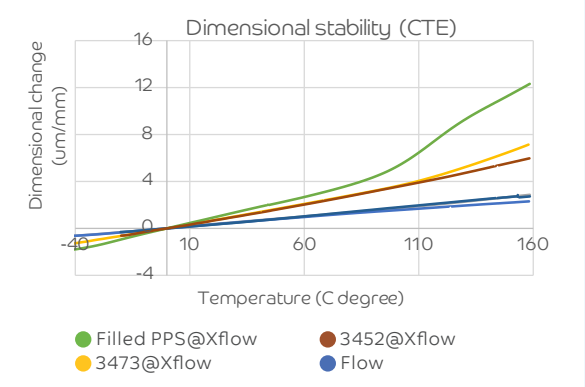
260 °C peak temperature SMT profile



No deformation after SMT

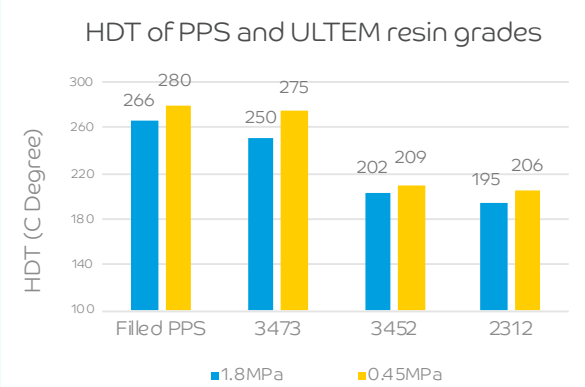
COEFFICIENT OF THERMAL EXPANSION (ISO 11359-2)

Cross flow improvement over glass filled PPS for improved dimensional stability



IMPROVED HEAT DEFLECTION TEMPERATURE (ISO 75)

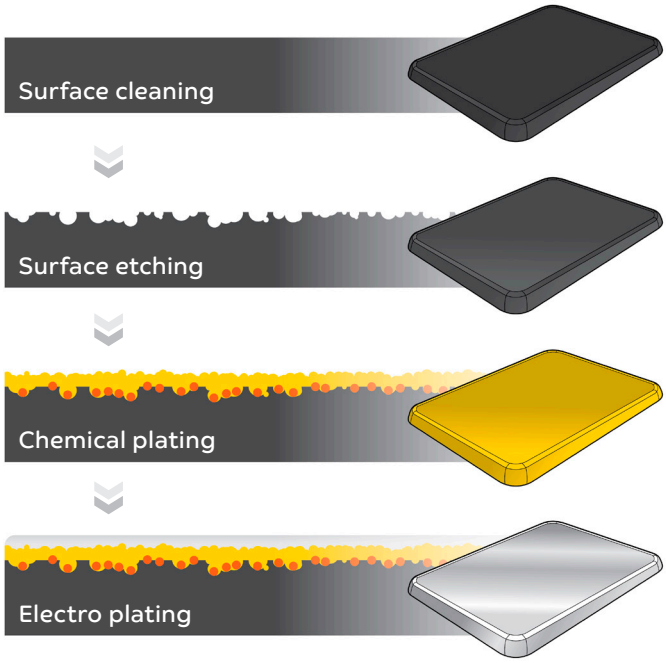
ULTEM 3473 resin has a HDT close to glass filled PPS



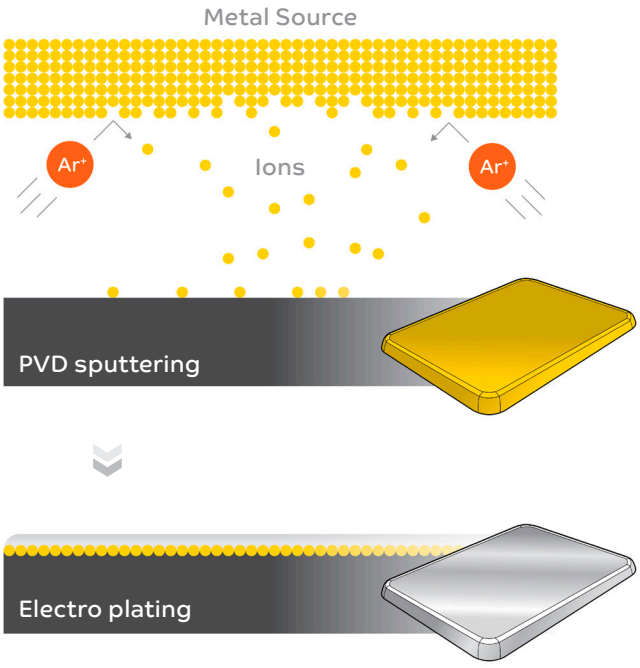
POTENTIAL FOR METAL REPLACEMENT USING ULTEM™ RESIN

ULTEM resins have excellent surface metallization performance and are compatible with mainstream plating processes. An excellent candidate for 5G networking components, ULTEM resins can also be considered for use in other industries where metal replacement is desired. ULTEM resins can be used in metalization processes like electroless plating, electro-plating and physical vapor deposition (PVD).

ELECTROLESS PLATING & ELECTRO PLATING



PVD SPUTTERING & ELECTRO PLATING



To address varying product and processing requirements, multiple ULTEM resin grades are available in the portfolio and can be considered for metal replacement. Each of these grades show an excellent adhesion to metal, low surface roughness and great resistance to blistering and delamination after exposure to thermal shocks and long periods of humidity.

GLASS FILLED ULTEM RESIN GRADES			
2312	2312EPR	3452	3473
• Isotropic CTE • Low modulus	• Isotropic CTE • Low modulus • Easier plating	• Low/stable CTE • High modulus • Low °C SMT	• Low/stable CTE • High modulus • High °C SMT • Good flowability • Strength

Excellent adhesion to metal

Cross Cut 5B

Great resistance to thermal shock

No blistering and delamination (40°C–110°C, 1000 cycles)

Low surface roughness

Ra<1.6um (electroless) Ra<0.5um (PVD)

Great resistance to humidity

No blistering and delamination (85°C/85%H, 1000 hours)

ULTEM™ RESIN KEY PROPERTIES

	Unit	Standard	ULTEM 2312 resin	ULTEM 2312EPR resin	ULTEM 3452 resin	ULTEM 3473 resin
CTE (Flow)	um/(m-°C)	ISO11359-2	23	37	19	19 (Plaque)
CTE (xFlow)	um/(m-°C)	ISO11359-2	27	39	36	25 (Plaque)
HDT (1.8MPa)	°C	ISO75	192	192	200	250
HDT (0.45MPa)	°C	ISO75	206	204	207	275
Flexural Modulus	MPa	ISO178	6000	5500	12000	14500
Notched impact	kJ/m2	ISO180	5	5	5	6.5
Un-notched impact	kJ/m2	ISO180	20	25	14	17.3
Tensile modulus	MPa	ISO527	6000	5300	12500	15900
Tensile stress@break	MPa	ISO527	85	80	100	146
Tensile strain@break	%	ISO527	3	2	1.5	1.65
Shrinkage (Flow)	%	SABIC method	0.3-0.4	0.4-0.6	0.2-0.4	0.2-0.3
Shrinkage (xFlow)	%	SABIC method	0.45-0.55	0.4-0.6	0.3-0.5	0.3-0.5
MFR	g/10min	ASTM D1238	10.1 (337C, 6.7kg)	13.7 (337C, 6.7kg)	4.6 (337C, 6.7kg)	7.6 (320C, 5kg)

SABIC ISCC+ CERTIFIED RENEWABLE ULTEM RESIN SOLUTIONS

A new portfolio of bio-based ULTEM resins that delivers a lower carbon footprint while offering the same high performance and processability as incumbent ULTEM materials is now available.

ISCC
International Sustainability & Carbon Certification

Please consult our website to find more information:
https://www.sabic.com/en/products/specialties

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