EXTEM™ RESIN IN SENSOR APPLICATIONS

Devices like smartphones have created a revolution in the way people connect with each other. The electronic devices of tomorrow are trending towards improved user experience, functionality and seamless connectivity to the world. Sensors are key enablers supporting this ever increasing trend for improved connectivity, functionality and user experience in electronic devices, such as smart phones, tablets, drones, robots and security systems.

Optical sensors in consumer electronics use infrared (IR) wavelengths to sense or control movement, surroundings, shape of things, proximity, speed and direction. EXTEM™ TPI thermoplastic polyimide resin features low haze, IR transparency, high glass transition temperature and are therefore candidate materials typically used in applications particular for optical sensor lenses due to high refractive index, low moisture uptake and the possibility to use precision injection molding of freeform optics.

EXTEM resin's extreme high temperature capabilities (glass transition temperature 267°C / 513°F) provides the opportunity for use in lead free reflow soldering processes enabling cost effective and productive assembly of micronized components.

TYPICAL PERFORMANCE CONSIDERATIONS

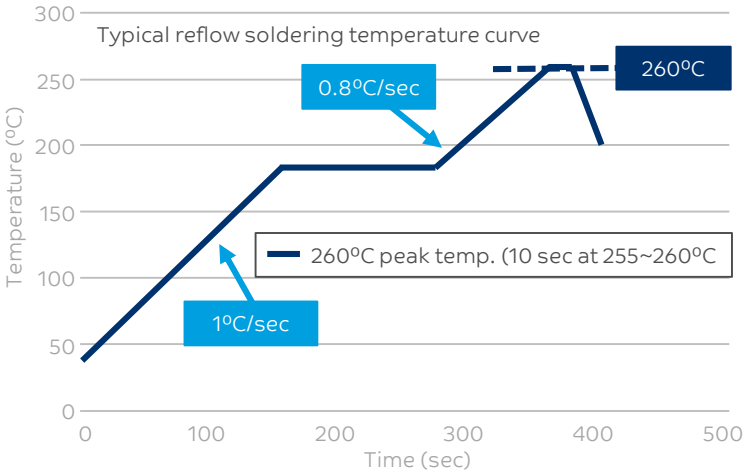
- Reflow soldering, lead free, up to 260°C
- Infrared transparency
- Low coefficient of thermal expansion
- Low shrinkage
- Melt processable

CHEMISTRY THAT MATTERS™

EXTEM™ RESIN FOR SURFACE MOUNT TECHNOLOGY

The smart phone market is driving miniaturization of sensors, with sensors having the size of just hundreds of micron to a few millimeters. EXTEM™ resin may be an excellent candidate material for sensor micro lenses. Using EXTEM resin in stead of epoxy resin typically eliminates the need for time consuming curing steps, while using EXTEM resin in stead of optical glass avoids expensive grinding and polishing steps. EXTEM resin can be injection molded into thin, precision optical lenses with freeform surfaces, in contrast to epoxy based solutions where geometry limitations occur.

With SABIC EXTEM resin our customers can typically also micro mold surface structures for Diffractive Optical Elements (DOE) or even a combination of both refractive as well as diffractive elements, while still being able to withstand the high heat reflow soldering process for on-chip assembly.



EXTEM XH1015 resin has proven its benefit and value for molding with production volumes of millions of components per week.

Lens diameter can be e.g. 1mm down to ~ 100µm

Source: Soprod SA

TYPICAL MATERIAL BENEFITS FOR INJECTION MOLDING

- Design freedom for supporting miniaturization of the lens geometry
- Overmolding supporting productivity improvement
- Recycling possibility
- Block ambient light by unique additive technology

SABIC'S THERMO OPTICAL PORTFOLIO

SABIC has several decades of history in supplying thermoplastic polymers in the opto-electronics industry. ULTEM™ resin has been widely used in, for example, fiber-optic components and is known for its building blocks enabling IR light transmission without degrading signal quality. Together with LEXAN™ CXT resin, this completes SABIC's high-end optical portfolio.

SABIC offers a broad portfolio of optical thermoplastics, so that customers have the option to select for their evaluation a grade with either highest heat resistance in combination with infrared transparency, or select a grade with lower heat resistance, but higher transparency in the UV-VIS spectrum.

TYPICAL OPTICAL PROPERTIES

Property	Conditions	LEXAN™ CXT17 resins	LEXAN™ CXT19 resins	ULTEM™ DT1810EV resins	ULTEM™ 1010 resins	EXTEM™ XH1015 resins
Glass transition temperature (°C)		175	195	201	217	267
Light transmittance	1 mm	>89%	>89%	>85%	>83%	>52%
(ASTM D-1003)	2 mm	>88%	>88%	>83%	>78%	>35%
IR light transmittance						
850 nm	1 mm	89.9	89.7	88.5	88.2	84.6
1310 nm	1 mm	90.0	89.8	89.1	88.8	87.7
Refractive index	F-line (486 nm)	1.618	1.624	1.676	1.685	1.679
(measured at 23°C per ISO 489)	D-line (589 nm)	1.603	1.609	1.655	1.662	1.657
	C-line (656 nm)	1.596	1.603	1.646	1.653	1.648
	850 nm	1.586	1.592	1.633	1.639	1.634
	1310 nm	1.577	1.583	1.620	1.626	1.648
	1550 nm	1.576	1.58	1.617	1.623	1.618
Abbe number	-	30	30	21	21	18
dn/dT (10^{-5})	23-140°C (850 nm)	-12	-12	-11	-11	-11

CONTACT DETAILS

Greater China Region
Julian (Wei) Wang
Julian.Wang@sabic.com

Japan, SEA, India Region
Katsura Hayashi
Katsura.Hayashi@sabic.com

Europe
Bernd Grammer
Bernd.Grammer@sabic.com

Americas
Brandon Byon
Hyon.Byon@sabic.com