Heraeus Group The Global Technology Company

Heraeus Electronics is a business unit of the Heraeus Group. The globally leading technology group is headquartered in Hanau, Germany. Founded in 1851, it is a familyowned portfolio company which traces its roots back to a pharmacy opened by the family in 1660. Today, Heraeus combines businesses in the environmental, energy, electronics, health, mobility and industrial applications sectors.

In the 2017 financial year, Heraeus generated revenues of €21.8 billion. With approximately 13.000 employees in 40 countries, the

With technical expertise, a commitment to excellence, a focus on innovation and entrepreneurial leadership, we are constantly striving to improve our performance. We create high-quality solutions for our clients and strengthen their long-term competitiveness by combining unique material expertise with leadership in technology. 31414-Ę

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Europe, Middle East and Africa Phone +49 6181 35 3627 electronics.emea@heraeus.com **Creating possibilities in heater applications**

The descriptions and engineering data shown here have been compiled by Heraeus using commonly-accepted procedures, in conjunction with modern testing equipment, and have been compiled as according to the latest factual knowledge in our possession. The information was up-to date on the date this document was printed (latest versions can always be supplied upon request). Although the data is considered accurate, we cannot guarantee accuracy, the results obtained from its use, or any patent infringement resulting from its use (unless this is contractually and explicitly agreed in writing, in advance). The data is supplied on the condition that the user shall conduct tests to determine materials suitability for particular application.





Production Sites and Service Labs Close to Our Customers Around the World



We are Heraeus Electronics

We are one of the leading manufacturers of materials for the assembly and packaging of devices in the electronics industry.

We develop sophisticated materials solutions for consumer electronics and computing, automotive, LED, power electronics and communications.

Our core competencies include bonding wires, assembly materials, thick film pastes as well as roll clad strips and substrates, and their integration into perfectly matched systems.

Our expertise is your competitive advantage

For more than 50 years, Heraeus Electronics has been a market leader innovating materials solutions for the thick film industry.

We have helped clients develop their ideas into feasible products that not only provide unlimited dimensions and possibilities, but excellent heating uniformity and reliability.

PRODUCTION SITES

Hanau, Germany Chisoda, Romania West Conshohocken, USA Kulaijaya, Malaysia Changshu, China Zhaoyuan, China Incheon, Korea Singapore (2x)

SERVICE LABS

Hanau, Germany West Conshohocken, USA Shanghai, China Singapore



Headquartered in **Hanau, Germany**



More than **50 years** of experience in providing materials for electronics industry



Over **1400** employees worldwide



Product distribution to over **50 countries**



9 production sites across 7 countries

Advantages of Thick Film Technology

Thick film materials for heater applications provide precision elements ideal for space-limited form factors and extremely fast response times, up to 150 °C/ sec. With operating temperatures from below zero through 1000 °C, thick film technology provides heating elements with outstanding environmental and chemical stability for extended product lifetimes and lower cost of ownership.



Our Experience in the Field of Heater Application

Electrical

stove burners,

pressing irons,

kettles, coffee

makers, food

and dishwashers.

humidifiers.

waffle irons,

We understand the challenges that our clients face in meeting the demands of heater applications. We harness our in-depth knowledge and experience to develop innovative solutions to help our clients achieve product excellence.





Temperature

controls:

sensors,

batteries,

seat heaters,

window/mirror

defrosters, PC

windows, EV

Batteries.

ELECTRONICS

Heating devices for print heads and copy machines, circuit temperature control and management.

steamers, hair straighteners/ curlers, hand dryer units, clothes driers



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COMPUTERS



HEALTHCARE

Sterilization chambers for medical and dental instruments, cauterization, nebulizer heaters and respiratory therapy circuits.



Water and chemical heating, hot plates, humidifiers, food processing, heaters for analytical instrument, injection molding nozzles (plastics processing), semiconductor wafer processing.

	PLASTICS		METALS			
HERAEUS ELECTRONICS Heater Systems by Substrate Type	PET, PEN	FR4, Polymide	Aluminum (Celcion®)	Stainless Steel (Heramic®)	Oxic (Al Zr	
Operating temperature and brief description	Up to 100 °C Flexible and low temperature heater applications.	Up to 250 °C Higher operating temperature polymer applications.	Up to 200 °C Designed to build heater circuits directly onto aluminum substrates. Unique formulation minimizes bowing on a variety of aluminum grades.	Up to 350 °C Heramic [®] is a lead-free, RoHS/ REACH compliant, thick film system for Heaters on Steel.	Up to 70 Proven heate temperature thermal cycl times. RoHS	
Conductor traces and termination pastes	LTC3602 (Ag) · Curing 100 - 145°C · < 8 mΩ/sq/mil · High conductivity, low Ag (52%), thin printing	LTC3510 (Ag) 175 - 225°C curing < 35 mΩ/sq/mil • SAC305 Solderable	C8829D (Ag) · 550 - 570°C firing · < 3 mΩ/sq at 12 μm · Good solderability and leach resistance, Al wire bondable	SC1001 (AgPt) • 850°C firing • < 3.5 mΩ/sq/mil at 12 μm • Excellent fired film density, solder leach resistance and solder acceptance	C8728 (Ag) C4729A (AgP C2160B (AgP · ≥ 850°C firit · Wide range (specific needs C3620 (Pt) · 850 - 1100 temperatures,	
Resistive heating materials	LTR4600 Series • Curing 120 - 200°C • 10 - 1kΩ/sq/mil values • Halide free, stable resin system		HTR 12000AR Series · 550°C firing · 2 - 100 Ω/sq/mil values · 0 ± 700 ppm TCR · Pb-free resistor system, compatible on Celcion IP6075 and C8829D AR21 - 350 Series	SR21 - 350 Series · 850°C firing · Range: 18 - 100 mΩ/sq at 11 - 16 μm · Pure Ag resistor paste with 3500 ppm HTCR · Designed for SD1010A compatibility · Post fired	R8900 Series R2200 Series · 850°C firing PC10000 Serie · 1100 °C firin R400A Series C 3620 (Pt) - 3 · 850 - 1100°C temperatures	
Insulators / Dielectrics			IP6080A / IP6085 (4 layer system) · 550 - 600°C firing · BDV: >1000 VDC/mil · 50 - 60 μm thickness · Compatible with 3000, 4000, 5000 and 6000 grade aluminum substrates	SD1010A	IP9217 (3 la - 850°C firin - BDV: >500 - Used as die IP9227 (2 la - 850°C firin - BDV: >500 - Used as die	
Overglazes / Soldermask		PD5100 NW • 150 - 280°C curing • 90 - 110 μm thickness • Excellent solvent resistance, chemically inert	 SM2000 (Soldermask) 200°C curing 15 - 30 µm thickness, SAC305 Excellent solvent resistance, chemically inert PD5100 NW 150 - 280°C curing 90 - 110 µm thickness Excellent solvent resistance, chemically inert 	SD1019 (Overglaze) • 850°C firing • Compatible with 430 and 444 SS	IP9036A (0) · 600 - 620° IP9217 (Ove · 850°C firin · Compatible	

CERAMICS

de based N₂0₃, ZTA, TrO₂, YSZ) Nitride base (AIN)

0°C

ter materials for high e stability, thermal shock, ling, and fast response S and REACH compliant.

Up to 700 °C

Fully compatible for high watt density designs, thermal cycling and shock, and fast response times. RoHS and REACH compliant.

Pt) Pd) ring for all listed e of choices for applications ds- all solderable

0°C firing, high operating s, solderable

s - ± 100ppm s Pb-Free g for all listed

ries Pb-Free ing, high operating temperatures

s mOhm Resistors, Pb-free, low TCR

- 3000ppm HTCR °C firing, high operating

layer system) ng 0 V (DC) / mil ielectric or cross over

layer system) ng O V (DC) / 40µm ielectric or cross over

Overglaze) D°C firing

verglaze) ng e across oxide substrates C8757 (Ag) C2360 (AgPd) · ≥ 850°C firing for all listed · Wide range of choices for application specific needs - all solderable

C3620 (Pt) · 850 - 1100°C firing, high operating temperatures, solderable

9000 Series - ± 50ppm R2211, R2221 Pb-Free · 850°C firing for all listed

PC10000 Series Pb-free · 1100°C firing, high operating temperatures

C3620 (Pt) - 3500 ppm HTCR · 850 - 1100°C firing, high operating temperatures

IP9242 (3 layer system) · 850°C firing

- · BDV: >400 V (DC) / mil
- · Used as dielectric or cross over

• 500 - 600°C firing

IP9241 (Overglaze) • 850 - 950°C firing

Compatible across AIN substrates