

Advanced Silicone Elastomers for Electronic Applications



Ian Taylor

Silicone Elastomers Distributors EMEA

& UK Sales Manager



INTRODUCTION ABOUT THE CHT GROUP

- The **CHT Group** is a global specialty chemicals company that is **owned by foundations**, giving it long-term stability and independence. Its profits help fund the **Reinhold Beitlich Foundation**, which supports social, educational, environmental, and scientific projects worldwide
- Medium-sized global player for silicone chemical manufacture
- 3 Business Fields – Industrial Solutions – Textile Solutions – Functional Chemicals
- Worldwide >25 companies
- Worldwide more than 10,000 customers
- More than 5000 products
- Revenue in 2023 over €605 million
- Silicone production sites in UK, Germany, USA, Italy, & China
- Drive towards sustainable chemical solutions

Independent service for evaluating the business practices and significant sustainability impacts of companies and supply chains.



OVERVIEW BUSINESS DIVISIONS & MARKET SEGMENTS



CHT UK – Bridgwater, Somerset

- Over 40 years experience of manufacturing excellent quality silicone compounds which perform to very high standards even in the most demanding of applications.
- Manufacturing & Distribution
- Customer Services
- Silicone Elastomers R&D and Tech Service Lab
- Bespoke formulations available on request



Approvals

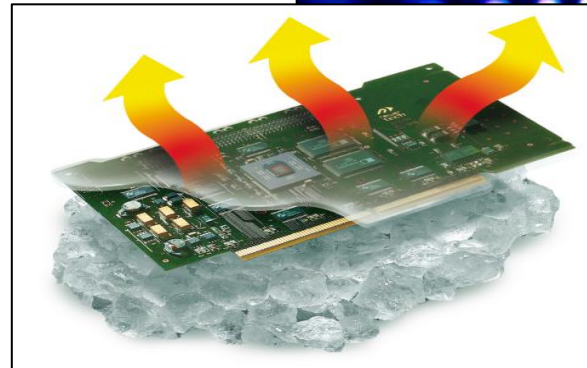
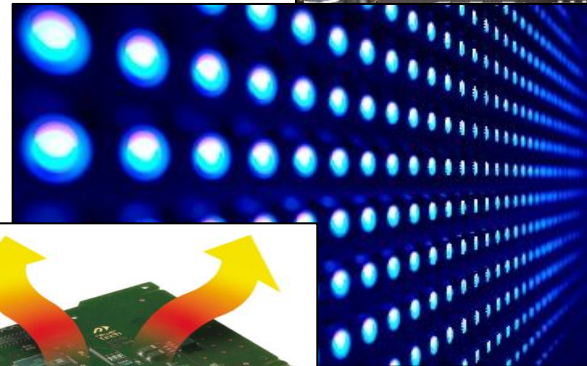
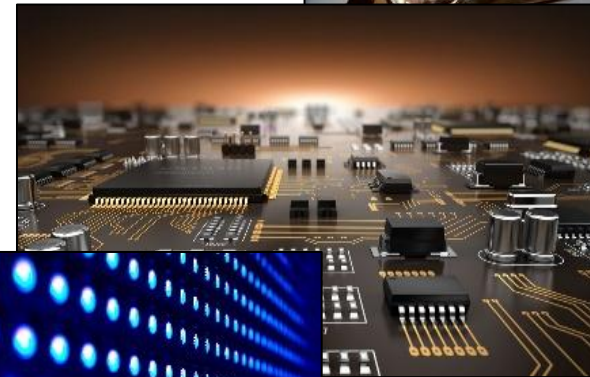
- Environmental Management System – ISO 14001: 2004
- Quality Management System – ISO 9001: 2008
- Energy Management systems – ISO 5001: 2018

THE CHT GROUP

PERFORMANCE MATERIALS

CHT develop, produce and sell speciality chemicals and tailor-made solutions for our customers in the following industrial sectors and markets all over the world:

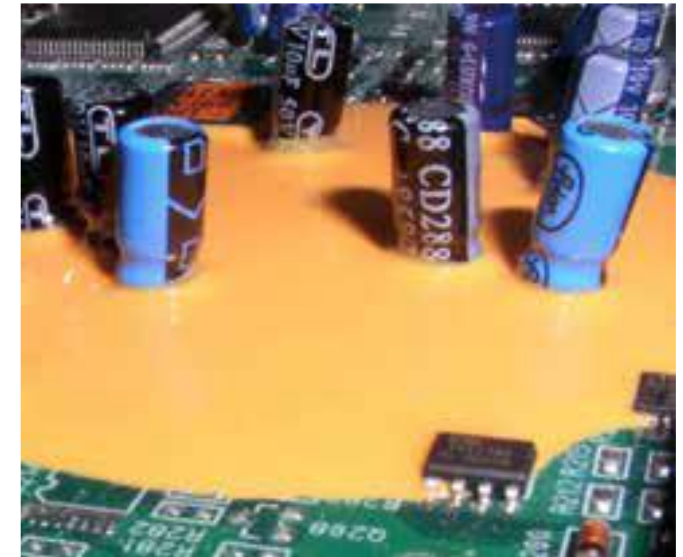
- Aerospace
- Automotive
- Electronics
- LED & lighting
- Thermal transfer



WORLD CLASS SILICONES FOR WORLDWIDE SOLUTIONS

SILICONE ADHESIVE SEALANTS
POTTING & ENCAPSULATION COMPOUNDS
THERMAL TRANSFER MATERIALS
CONFORMAL COATINGS
GREASES & PRIMERS

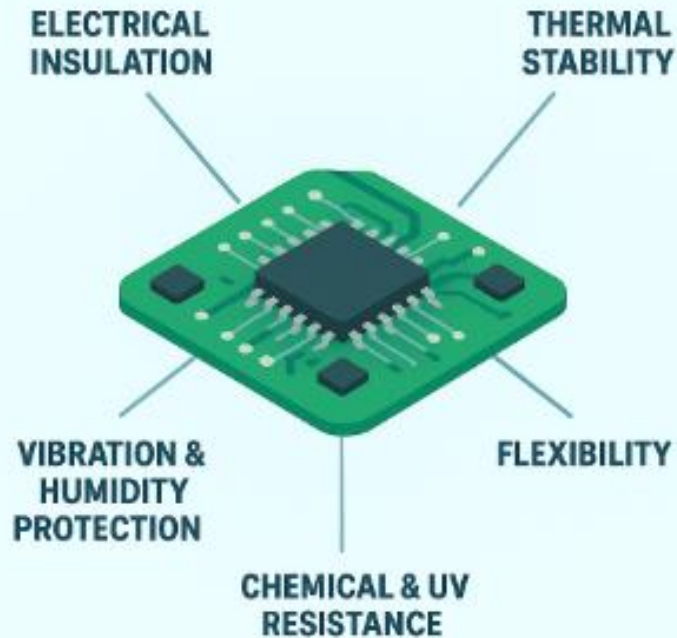
SILICONE ENCAPSULANTS & ADHESIVES FOR TECHNICAL APPLICATIONS



- Optically clear
- Thermally conductive
- UL 94 V-0 approved
- High temperature resistance
- Range of shore hardness
- 1 & 2 Part materials
- RTV & Heat Cure



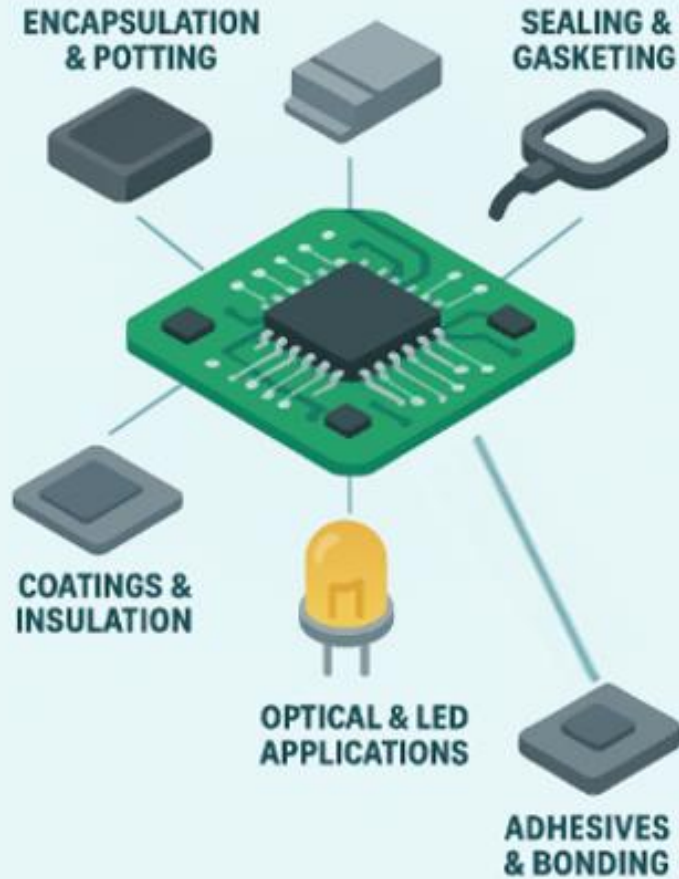
WHY USE SILICONES FOR ELECTRONIC APPLICATIONS



Silicone elastomers in electronics can provide environmental protection, mechanical cushioning, thermal management, optical clarity, and sealing reliability.

- Products to seal, bond, pot, coat or encapsulate
- Mechanical and environmental protection
- Chemically neutral, non-corrosive
- High and low temperature stability
- Thermally conductive products for prevention of excessive heating and component failures

APPLICATIONS OF SILICONE ELASTOMER IN ELECTRONICS



Encapsulation & Potting

Protects sensitive electronic components (chips, circuits, sensors) from:

- Moisture, dust, and vibration
- Thermal cycling and mechanical stress
- Used in automotive ECUs, power modules, and aerospace electronics.

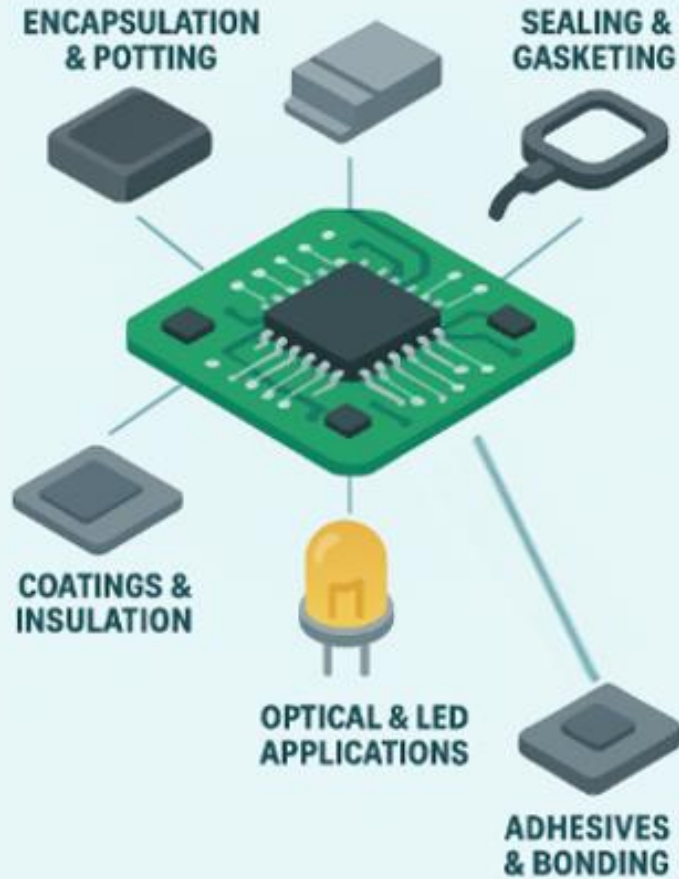
Thermal Management

Filled silicone elastomers (with alumina, BN, or other fillers) provide **thermal conductivity** while maintaining electrical insulation.

Used as:

- **Thermal interface materials (TIMs)** between chips and heat sinks
- Gap fillers, pads, and adhesives for LEDs, CPUs, and power devices.

APPLICATIONS OF SILICONE ELASTOMER IN ELECTRONICS



Sealing & Gasketing

Silicone elastomer O-rings, gaskets, and form-in-place gaskets (FIPGs) are common in:

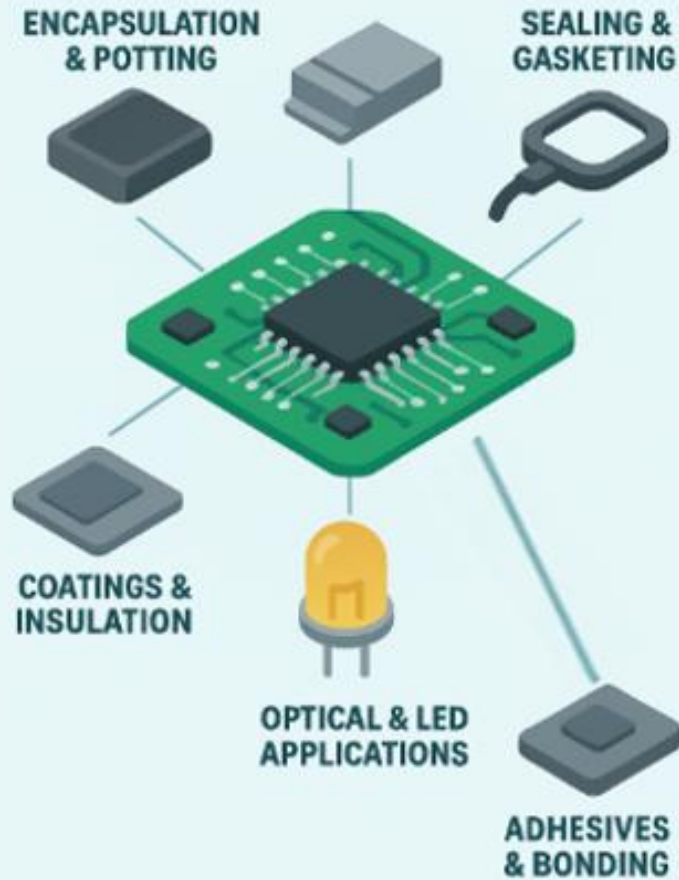
- Smartphones, wearables, and consumer devices
- Automotive connectors and battery housings
- Industrial electronics enclosures (IP-rated).

Coatings & Insulation

Conformal coatings of silicone elastomers:

- Improve high-voltage insulation (e.g., in power supplies and transformers)
- Protect PCBs against humidity and chemical exposure
- Used in outdoor high-voltage insulators.

APPLICATIONS OF SILICONE ELASTOMER IN ELECTRONICS



Optical & LED Applications

Optically clear silicone elastomers are used in:

- LED encapsulants and lenses (UV stable, high transparency)
- Automotive headlamp optics
- Display backlighting systems.

Adhesives & Bonding

RTV elastomers serve as:

- Structural adhesives in module assembly
- Die-attach and underfill materials
- Flexible interconnect bonding.

SO WHAT PRODUCTS CAN CHT SUPPORT YOU WITH?

1-Part & 2-Part RTV Adhesives

Alkoxy Cure:

- Non-corrosive
- Good adhesion
- Generally slower curing
- Room temperature cure

Acetone Cure:

- Fast curing
- Non-corrosive
- Good adhesion
- Room temperature cure

Packaging

- 310ml cartridges 1- part RTV
- 20kg Pails
- 200kg drums



1-part & 2-part Silicone Sealants

- Two components
- Silicone elastomer system
- Normally exhibiting good flow & self-levelling properties
- Room temperature & / or heat curing materials
- Two different curing mechanisms

Addition Cure

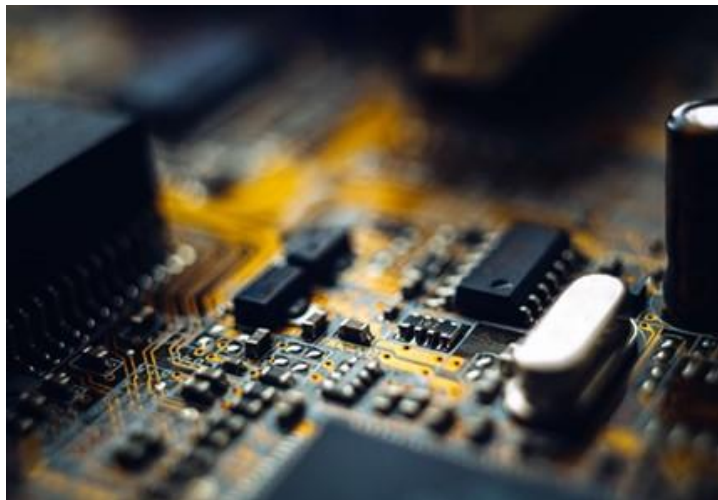
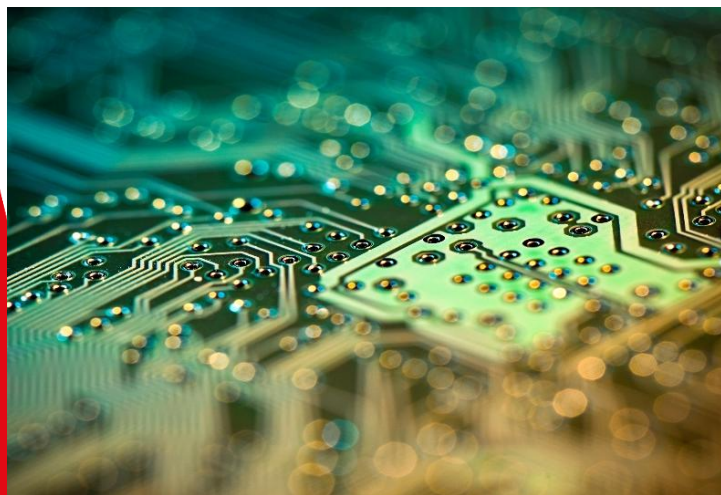
Room temperature & heat
accelerated cure
Does not need moisture



Condensation Cure

Room temperature cure only
Needs moisture

ELECTRONIC APPLICATIONS



STAKING FOR ELECTRONICS

Helps support electronic components to the board
Heat transfer with thermal conductivity

Some of the one-part silicones made in the UK are ideal for this type of application.

One part
Fast cure
Easy to use.

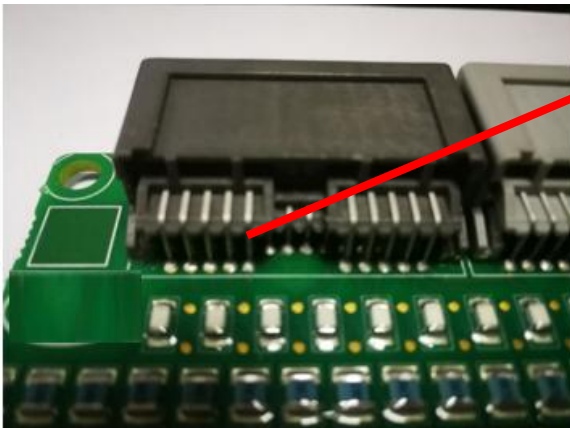


AS1740

- MIL 46146B physical / chemical requirements
- UL recognised in file No. E334038
- Contains UV tracer for visual inspection
- Self levelling, adhesive liquid

Example Applications:

Coating Components in EV
Fixing Components on PCBs
Protective coating for electronics in welding equipment



AS1740

Additional information:

Advantages:



- Non-corrosive
- excellent adhesion to most common substrates.

Product features:



- Thermal conductivity = 0.18 W/mK
- Tack free time at 23°C = 18 min
- Tensile strength = 1.8 N/mm²
- Dielectric strength = 457 V/mil
- Volume Resistivity = 2.25E+15 ohms cm

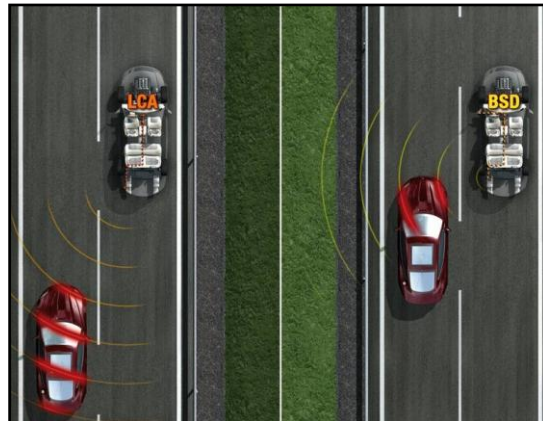
AS 1803

- White sealant
- 1-part neutral acetone cure
- UL certified under file No. E334038 (UL94 HB approved)
- Good thermal conductivity
- Fast skin formation

Example Applications:

Speed & Motion Sensors

(Heat transfer in the control units of the sensor from chip to aluminum housing)



Additional information

Advantages:



- Non-corrosive
- Flame retardant
- Heat dissipating
- Rapidly curing

Product features:



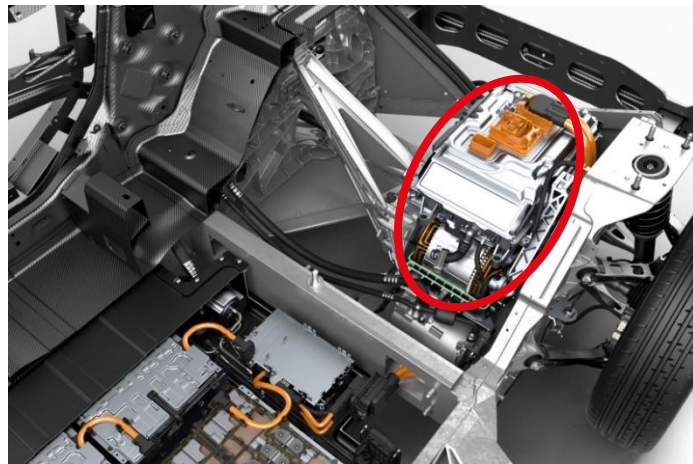
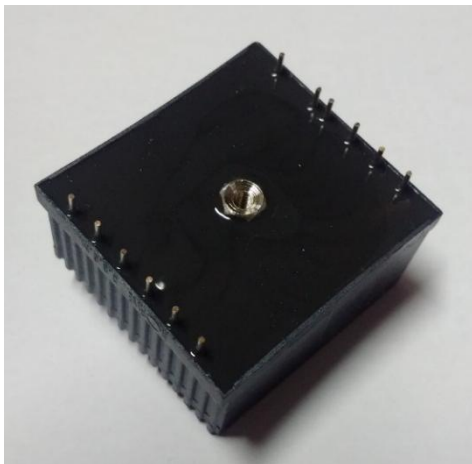
- Thermal conductivity = 1.55 W/mK
- Tack free time at 23°C = 4 min
- Tensile strength = 2.8 N/mm²
- Dielectric strength = 39 kV/mm
- Volume Resistivity = 1E+14 Ω·cm

QSiI 553 & QSiI 553LV

- Black potting materials
- 2-part addition cure (1:1)
- UL94V-0 listed in file No. E205830
- Thermally conductive
- Low viscosity

Example Applications:

- PCB protection of military aircraft transponder (QSiI 553)
- Potting of power module for electric car (QSiI 553LV)



Additional information

Advantages:



- Flame retardant
- Heat dissipating
- Easy castable
- Excellent electrically insulating

Product features:



- Thermal Conductivity = 0.68 or 0.65 W/mK
- Viscosity (mixed) = 6,000 or 4,000 mPa·s
- Dielectric strength = 19.7 kV/mm
- Comparative Tacking Index = 600 V
- Pot life at 23°C = 100 min

EGEL 3000

- Optical non yellowing
- Low viscosity
- 1:1 ratio for automatic dispensing
- Easy degas
- High insulation
- High environmental protection

Example Applications:

- Potting of the electronics of digital water meters Potting
An optical potting is required to be able to pot also the display.



Gel



Additional information:

Advantages:



- protection from vibration,
- thermal or mechanical shock
- protection from water and many
- environmental contaminants.
- It has excellent dielectric properties.

Product features:



- Thermal Conductivity = 0.18 W/mK
- Viscosity (mixed) = 630 Cp
- Dielectric strength = >470 V/mil
- Pot life at 23°C = >45 mins

QSIL216

- Convenient 10:1 mixing ratio for use in
- automated dispensing equipment or hand mixing
- Contains no solvents
- Non-yellowing catalyst system
- Chemical composition provides hydrolytic stability and reversion resistance

Example Applications:

Potting / Encapsulation of Atex LED's for the oil and Gas industry.



Additional information:



Advantages:

- Non-yellowing under UV light
- Optically clear
- Excellent flow
- Shock resistance

Product features:

- Thermal Conductivity = 0.18 W/mK
- Hardness = 40 Shore A
- Viscosity (mixed) = 4000 mPa·s
- Dielectric strength = 500 V/mil
- Volume Resistivity = 1.7 E+15 ohms cm



SE3000

- Orange encapsulant and potting material
- 2-part addition cure (1:1)
- UL listed in file No. E334038 (UL94V-0)
- Thermal outgassing compliant to ECSS-Q-ST-70-02C
- Not self-bonding
- Good thermal conductivity
- Low viscosity

Example Applications:

- Potting of electromagnetic receiver
- Heater elements (Thermal transfer & noise reduction)



Additional information

Advantages:



- Flame retardant
- Low volatile content (Minimises the potential interference risk of electrical connections)
- Cured elastomer can be repaired
- Heat dissipating
- Easy castable

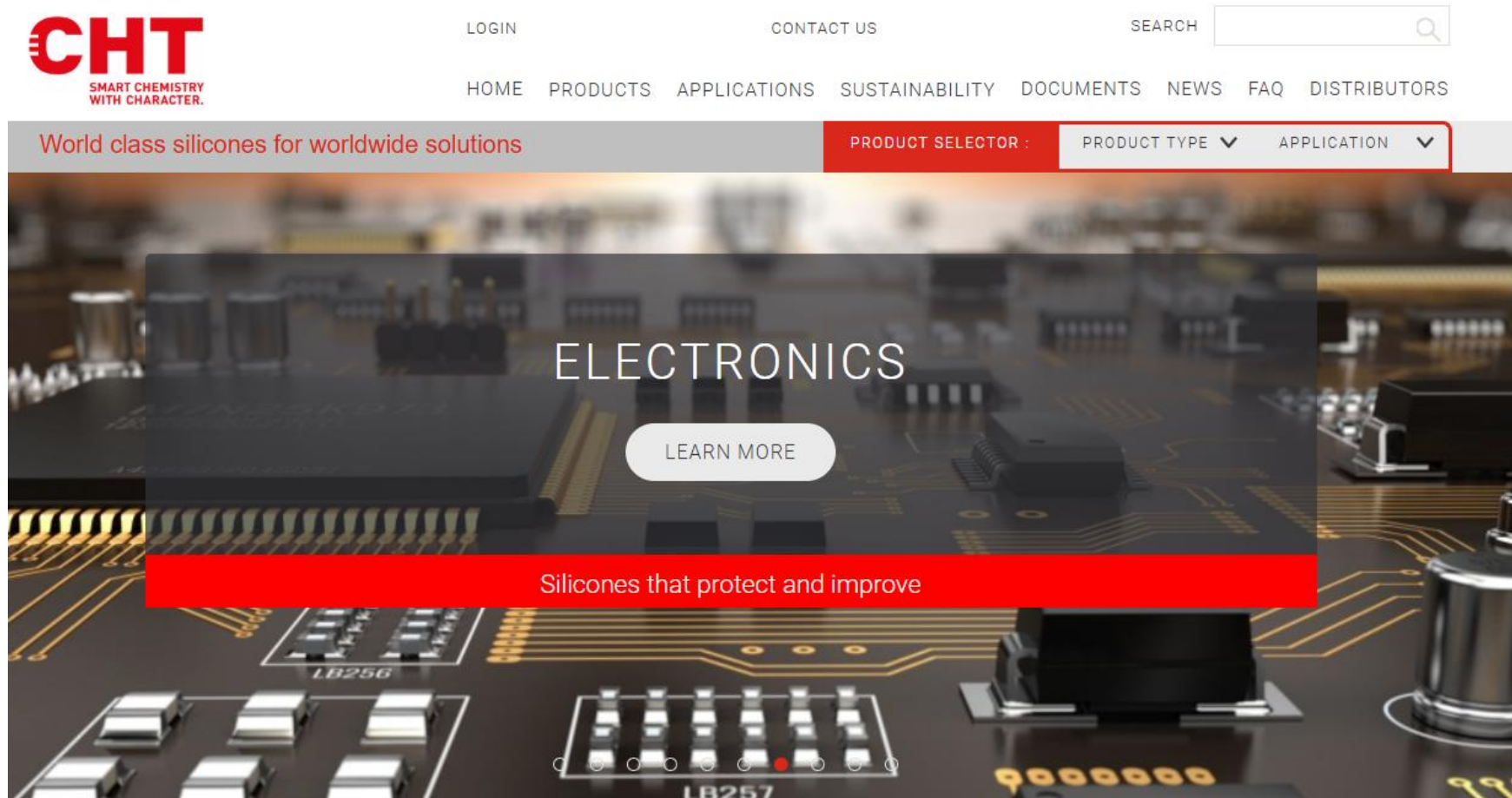
Product features:



- Volatiles <300 ppm
- Thermal Conductivity = 1.2 W/mK
- Viscosity (mixed) = 2,000 mPa·s
- Dielectric strength = 14 kV/mm
- Volume Resistivity = $1.8E+14 \Omega \cdot \text{cm}$

WEBSITE

<https://cht-silicones.com>



TECHNICAL GUIDES



CHT
SMART CHEMISTRY
WITH CHARACTER.

SILICONE ADHESIVES

RTV and HEAT CURE silicone adhesives for sealing, bonding and thermal management.



CHT
SMART CHEMISTRY
WITH CHARACTER.

SILICONE ENCAPSULANTS

RTV and HEAT CURE silicone encapsulants for electronics potting and thermal management

Overview

Adhesives come in a wide range of chemistries each having its special properties and applications. In this context silicones are often referred to as sealants rather than adhesives, which lead many people to the conclusion that they will not perform as an adhesive.

Adhesives require certain properties, good adhesion to a required substrate, physical strength to avoid cohesive failure, resistance to environmental conditions and the ability to maintain these properties over a given lifetime.

A sealant on the other hand may only require limited adhesion, with little physical strength, but must be resistant to the environmental conditions it is exposed to.

If careful attention is given to product selection with the specific application in mind, silicones can perform as both adhesives and sealants, thereby making them a very versatile and cost effective solution in a wide variety applications.

- ▶ Silicone elastomers in general have these general physical properties:
- ▶ Wide operating temperature range -115 to 310°C
- ▶ Excellent electrical properties
- ▶ Flexibility
- ▶ UV resistance
- ▶ Good chemical resistance
- ▶ Resistant to humidity and water
- ▶ No or low toxicity

Silicone adhesive sealants use two basic silicone chemistries:

Condensation cure

These use moisture in the atmosphere to trigger the curing process at room temperature and are commonly referred to as Room Temperature Vulcanising (RTV's). These are normally supplied as 1-part systems although they can be formulated as 2-parts for fast curing systems.

Addition cure

These require heat to initiate the curing process, and this technology can be supplied as either 1 or 2-part systems.

RTV Silicone Adhesive Sealants

This type of silicone chemistry is the most widely used in the formulating of silicone adhesive sealants utilising the moisture in the atmosphere to react with chemical cross linkers, thereby enabling the formation of a silicone elastomer. They are normally described in terms of the small amount of the chemical by-product produced during the reaction.

The most common systems are:

- ▶ Acetoxy
- ▶ Oxime
- ▶ Alkoxy or Methoxy
- ▶ Acetone

All these alternative cure mechanisms will lead to the formation of an elastic and relatively tough silicone rubber however, some of the final physical properties of these rubbers will be substantially different. The chemical by-products have an impact on the products suitability for certain applications and will also affect the way the adhesive can be handled from a Health and Safety standpoint.

