



# Product Training Module for the use of TG4040s in remote radio head cooling

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# Introduction

- Purpose
  - This training module is used to give an introduction to t-Global Technology's TG4040S which is specifically designed for thermal management for remote radio head units (RRH)
- Objectives
  - To identify the key properties of the product range
  - To identify the key design criteria for product selection
- Content
  - Introduction and background to the product range
- Learning time
  - 15 mins

# Introduction

- Remote radio heads (RRH) and active antennas offer a significant improvement in functionality and cost of ownership over traditional telecom infrastructure
- Due to the harsh environments these units operating in active cooling is not generally a practical solution
- Passive thermal management using an interface pad and a heatsink is the only main to ensure reliability and product lifetime.





# Design Considerations

- The design of a efficient and reliable RRH relies on a clear understanding of thermal management issues
- The majority of heat comes from RF power amplifiers which occupy only approximately 1 square inch on the heat sink
- It is essential that this heat is spread evenly over the heatsink
- Design considerations such as heat-pipes or thicker heatsinks can be used for thermal management but add additional weight and cost
- It is far more efficient to ensure that the thermal interface between the components and heatsink transfers as much heat as possible



# Thermal Interface Considerations

- Due to the environment in which the RRH operates a grease would not be desirable interface product due to pump out issues
- The thermal interface must provide the following characteristics:
  - Ability to withstand a harsh environment
  - Excellent thermal conductivity
  - Ability to conform easily to a rough surface (softness)
  - Ease of manufacturing and rework
  - Low cost of ownership

# TG4040S

- TG4040S has been formulated to solve the many thermal issues of RRH units
- TG4040S offers the following benefits:
  - Unique gel like structure for supreme conformance to surfaces
  - High thermal conductivity for efficient heat transfer
  - A very high dielectric breakdown voltage
  - Excellent long term stability
  - Very low mass loss



# TG4040S - Datasheet

Property	TG4040S	Unit	Test Method
Colour	Blue	-	Visual
Construction	Silicone Gel	-	-
Optimum temp. range	-45 to 200	°C	-
Density	2.6	g/cm <sup>3</sup>	ASTM D792
Thermal Conductivity	4.2	W/m.k	ASTM D5470
Shore 00	20	-	ASTM D2250
t=1.0mm Thermal impedance @10psi	0.55	K-in <sup>2</sup> /W	ASTM D575
t=1.0mm Thermal impedance @50psi	0.41	K-in <sup>2</sup> /W	ASTM D575
t=1.0mm Thermal impedance @100psi	0.33	K-in <sup>2</sup> /W	ASTM D575
t=1.0mm Percent Deflection % @10psi	30	%	ASTM D575
t=1.0mm Percent Deflection % @50psi	56	%	ASTM D575
t=1.0mm Percent Deflection % @100psi	79	%	ASTM D575
Breakdown Voltage	14	KV/mm	ASTM D149
Volume Resistance	10 <sup>12</sup>	Ohm-cm	ASTM D257
Total Mass Loss	<0.4	%	ASTM E595
Tensile Strength	15	PSI	ASTM D412
Elongation	50	%	ASTM D412
Flame Rating	V-0	-	UL 94
REACH/RoHS Compliant	Yes	-	REACH / RoHS



# Summary

- Thermal management in RRH units poses some unique challenges
- Basic requirements for a thermal interface material for a RRH include:
  - High thermal conductivity
  - Good conformability
  - Low cost
  - Ease of rework
  - Good long term reliability
- TG4040S addresses all these issues and is available:
  - Thicknesses 1 – 5mm
  - As custom die cut parts or standard sheets