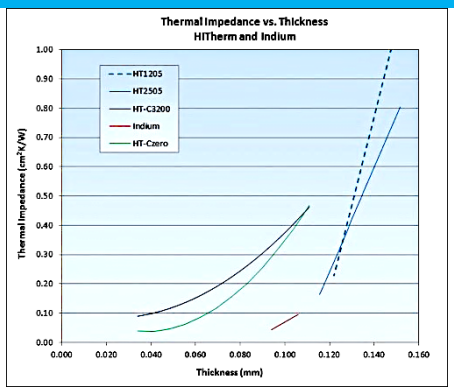
NEOGRAF SOLUTIONS

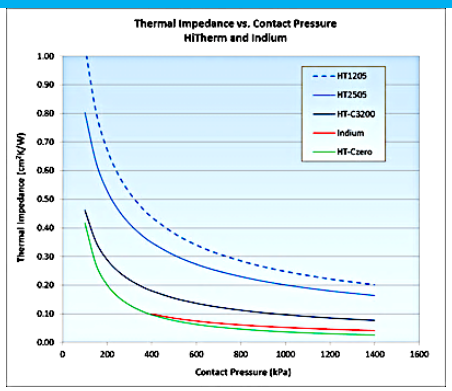
HITHERM™ Thermal Interface Materials

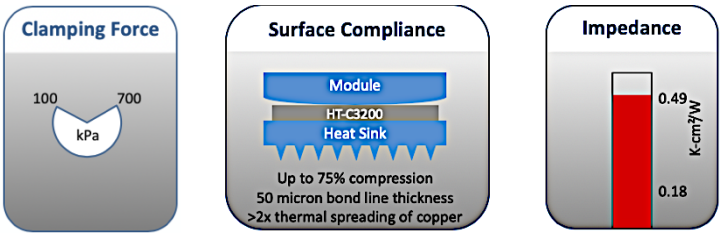
eGRAF® HITHERM™

Natural Graphite Thermal Interface Vs. Indium

New HT-C3200 Grades are compressible to thinner bond lines - thermal impedance values at indium levels







Overview

eGRAF® HITHERM™ HT-C3200 thermal interface materials are designed for use in applications requiring large surface, high contact pressure, high performance, low contact resistance and high thermal conductivity.

The flexible graphite materials can be die-cut to ensure exact fi while the compressibility of the material improves contact surface contact for high in-plane thermal conductivity and compensates for up to 100µ of flatness (no thickness recovery after compression).

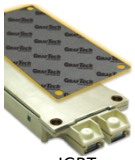
New version of eGRAF® HITHERM™ HT-C3200 (CZERO) thermal interface materials is redesigned as a competitive and close alternative to Indium.

Applications

- Power modules such as IGBT, RF devices used in:
- UPS and Inverters
- Motor Drives
- Base Stations
- Power Supply Modules, Rectifiers and Chargers

Motor Drives
Power Inverters

Telecommunications
CPU/GPU Thermal Interface

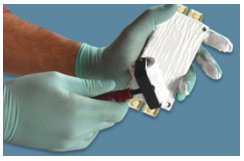


IGBT

Benefits

Compressible with thermal performance that matches traditional thermal grease.

- No pump-out and Dry-out failure modes
- Address the reliability challenges of mission critical applications in extreme temperature environments and harsh duty cycles.



Eliminate expensive dispensing equipment and messy rollers

Eliminate Dry-Out And Pump-Out Failures

HITHERM™ HT C3200 Pure Natural Graphite Thermal Interface		
Properties	**Unit**	**HT C3200**
Thickness	mm	0.200 +/-10%
Hardness	Shore A	-
Compressible - No Thickness Recovery After Compression	%	7
Thermal Conductivity In-Plane X-Y @ 700kPa	W/m-K	800
Thermal Conductivity Through-Plane Z @700kPa	W/m-K	7
Thermal Contact Impedance @ 200kPa	(K-cm²/W)	0.49
Thermal Contact Impedance @ 700kPa	(K-cm²/W)	0.18
Electrical Resistivity In-Plane (µΩm)	µΩm	-
Electrical Resistivity Through-Plane (µΩm)	µΩm	-
Electrical Conductivity In-Plane X-Y	S/cm	19000
Electrical Conductivity Through-Plane Z	S/cm	5
Coefficient of Thermal Expansion In-Plane X-Y (ppm/°C)	ppm/°C	0.4
Coefficient of Thermal Expansion Through-Plane Z (ppm/°C)	ppm/°C	27
UL Flammability Rating	U.L.	94V-O
Operating Temperature (°C)	-	-40 to +400
Specific Heat @ 25 °C	J/g-°C	0.8
RoHS Compliant	-	Yes
Lead/Halogen Free	-	Yes

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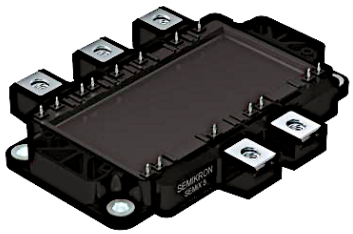
Part Number Reference		
HITHERM™ HT C3200 In Power Electronics IGBT Modules		
Manufacturer	**Module**	**eGRAF® Part Number**
Fuji Electric	62mm	G10118
	Dual XT	G10020
	PrimePACK™ 2	G10019
	PrimePACK™ 3	G10018
Infineon	62mm	G10118
	EconoDUAL™ 3	G10020
	EconoDUAL™4	G10121
	PrimePACK™ 2	G10019
	PrimePACK™ 3	G10018
Semikron	SEMIPACK	G10118
	SEMITRANS 3	G10118
	SEMITRANS 4	G10118
	SEMITRANS 5	G10118
	SEMiX 3p/3s	G10020
	SEMiX 5	G10121
Various	SOT-227	TBA

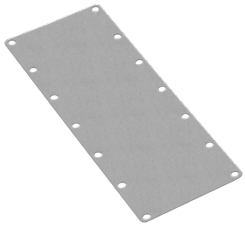


SOT 227 Module

62mm Module

EconoDUAL™ 3

PrimePACK™ 2



PrimePACK™ 3

Eliminate The Mess And Risk In Thermal grease

Property	No TIM "Dry Joint"	Grease	Silicon Pad	HITHERM™ TIM
Material Price	Surface Finishing	$	$$$	$$
Initial Thermal Performance	Worst	Best	Worst	Good
Long Term Thermal Performance	Worst	Good	Worst	Best
No Upfront Capital Cost (i.e. Dispensing Equipment)	✓	✗	✓	✓
Performance Consistency (Part to part variation)	✗	✗	✓	✓
Reworkable/Field Replaceable	✓	✗	✓	✓
Over 15 year rated life	✗	✗	✗	✓
NASA Outgassing Certified	✗	✗	✗	✓