

ULtraPHASE 60

The Latest Generation of Phase change
Dielectric Thermal Management Technology

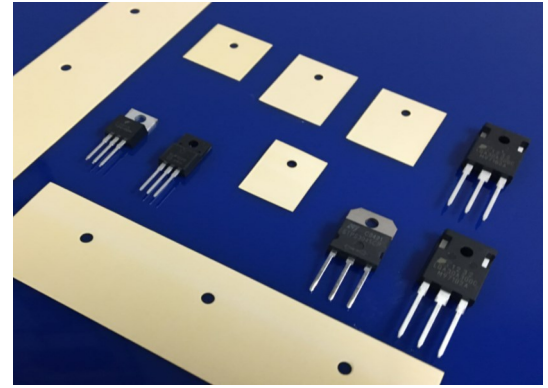
60°C Phase-Change Temperature

40% Improvement in Overall Thermal Performance*

* based upon 2.5 mil thick UltraPhase 60 material. Average improvement of thermal impedance within pressure ranges from 10 to 100 PSI compared to equivalent thickness of other double coated polyimide film phase change products.

UltraPhase 60 is the latest generation of dielectric phase change thermal interface material offering a significant increase in overall thermal performance packaged with same reliable dielectric strength as our DiaPhase 60 material. Built off the backbone of Dupont's Kapton MT+ (plus) offering almost twice the thermal conductivity of the standard Kapton MT series, UltraPhase 60 takes full advantage of combining the superior benefits of our phase change technology with this boosted performance in polyimide film thermal technology.

UltraPhase is available within 2 standard material thicknesses and available in master rolls, slit rolls, sheets or die cut by TIMTEL to a specific customer outline from prototype to production.



Typical Device

Application

- Non-Insulated Device
- Diodes/Relays
- Power Semiconductor
- Chassis Assembly
- Heat Sink/Case Sink
- Transistors
- Power Supply / UPS
- RF Components
- Non-isolated modules
- Large Surface Area

UltraPhase 60 Phase Change Compound

- * Phase Change Temp.....60°C
- * Compound Flow Design.....Thixotropic
- * Volumetric Expansion.....15%

UltraPhase 60 is a solvent free / silicon free compound design

UltraPhase 60 Material Total Thickness

- * KP1.5-L05.....0.0025" (0.064mm)
- * KP2-L05.....0.003" (0.076mm)

UltraPhase 60 Thermal Impedance

Thermal impedance testing performed per ASTM D5470

2.5 mil (0.064mm) UltraPhase 60

- * 10 PSI.....0.100 °C-in² / W | 0.64 °C-cm² / W
- * 20 PSI.....0.082 °C-in² / W | 0.53 °C-cm² / W
- * 40 PSI.....0.075 °C-in² / W | 0.48 °C-cm² / W
- * 80 PSI.....0.066 °C-in² / W | 0.43 °C-cm² / W
- * 100 PSI.....0.065 °C-in² / W | 0.42 °C-cm² / W

3 Mil (0.076mm) UltraPhase 60

- * 10 PSI.....0.165 °C-in² / W | 1.06 °C-cm² / W
- * 20 PSI.....0.142 °C-in² / W | 0.91 °C-cm² / W
- * 40 PSI.....0.117 °C-in² / W | 0.75 °C-cm² / W
- * 80 PSI.....0.104 °C-in² / W | 0.67 °C-cm² / W
- * 100 PSI.....0.099 °C-in² / W | 0.64 °C-cm² / W

UltraPhase 60 Dielectric Strength

- * 1.5 mil substrate version.....4900 V/mil (ASTM D149)
- * 2 mil substrate version.....4600 V/mil (ASTM D149)

V/mil value shown is for Kapton MT+ only

UltraPhase 60 Thermal Conductivity

- * KP1.5-L05 (2.5 mil).....0.80 W / m²K
- * KP2-L05 (3 Mil).....0.85 W / m²K

Other Information

- * RoHs Compliant / Halogen Free Compliant
- * Solvent Free / Silicone Free Compound Design

Standard UltraPhase 60 Pad Construction

60C Phase Change Thermal Compound (0.0005" / 0.013mm) - L05
Kapton MT+ Substrate (0.0015" / 0.038mm) or (0.002" / 0.051mm)
60C Phase Change Thermal Compound (0.0005" / 0.013mm) - L05

L10 (0.001"), L15 (0.0015") and L20 (0.002") heavier coating thickness available.

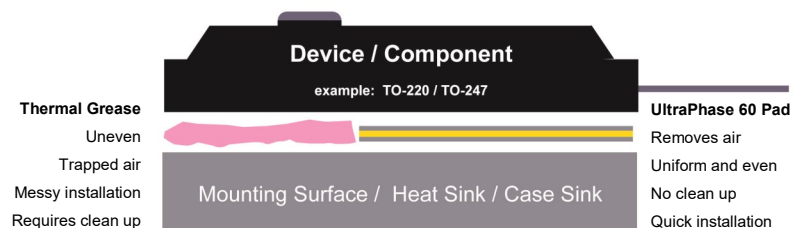
See page 2 for details regarding tack backing options

UltraPhase 60 Material Delivery Formats

- Master Rolls
- Die Cut Individuals
- Die Cut Reels
- Sheets
- Multiple Die Cut / Card
- Prototypes

Phase Change Pads.....A Superior Alternative to Thermal Grease

UltraPhase 60 is designed as a pre-formed thermally conductive "drop in place" pad that offers excellent thermal transfer characteristics not only through design of the compound formulation itself, however, through it's uniform pad thickness in X, Y, Z dimensions as well. From an installation perspective, thermal greases are difficult to dispense as well as provide inadequate coverage and a uniform thickness across the interface most often leaving trapped air leading to poor thermal transfer. Not to mention the thermal grease clean up required in unwanted areas afterwards.



Since UltraPhase 60 is manufactured with a specific thickness and die cut pattern, it can be placed instantly and immediately ready for component mounting. Due to it's thixotropic formulation design, compound is held within the interface with no worries of run-out into unwanted areas during normal device/component operation. Upon initial phase-change of the UltraPhase 60 compound, UltraPhase begins it's wetting out process allowing it to fill in any microscopic surface imperfections or uneven surface conditions across the interface as well as drive out any trapped air leading to increased thermal transfer performance keeping the device/component cool and reliable.

UltraPhase 60 pre-formed pads are shipped in clean sizable packs or continuous die cut reels instantly ready for cost effective installation and reliable thermal performance.

ULtraPHASE 60

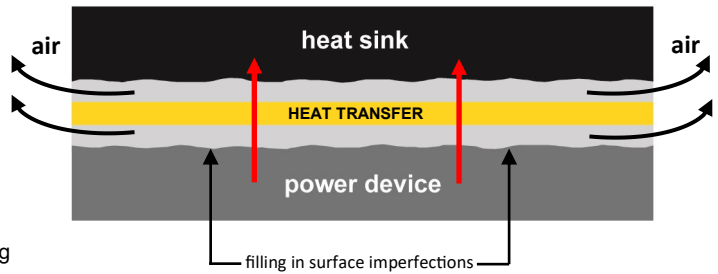
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Surface Flatness Recommendations

It is typically recommended that for larger surface area conditions with surface finishes exceeding 64 microns and/or flatness conditions exceeding 0.002" or more, thicker compound coating thicknesses should be considered to allow the UltraPhase 60 compound to adjust for these features during initial phase change. Filling a nominal gap requirement with smooth interface surfaces can typically be accomplished with thicker substrate options.

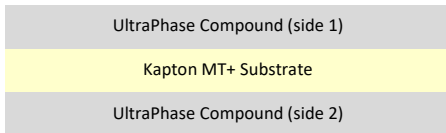
Driving Out the Air

A primary advantage of utilizing the UltraPhase 60 phase-change system is the ability to drive out air from within the interface during initial device cycling causing phase change and surface wetting of the thermal compound coating.

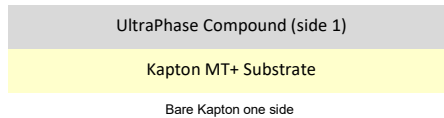


UltraPhase 60 Standard and Custom Material Constructions

Standard Double Coated Construction

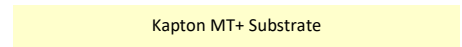


Single Side Coated



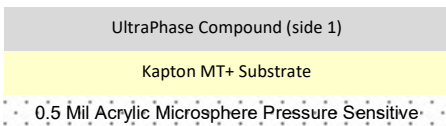
Uncoated Substrate Die Cut

Polyimide substrate only available as die cut to be used as a thermal shim with no phase change compound coating.

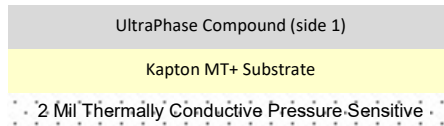


UltraPhase 60A Pre-Apply Attachment Options (100% surface backed)

Low Tack Repositionable (LT05)

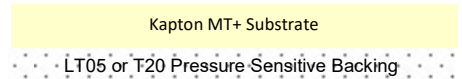


Thermally Conductive Tack (T20)



Uncoated Substrate Die Cut

Polyimide substrate only available as die cut to be used as a thermal shim with no phase change compound coating.



Note: the introduction of an additional tacking layer to 100% one side of UltraPhase will impact the overall thermal performance of the material. Contact us for performance impact data regarding the use of a PSA backing layer. PSA backing options have upper operating temperature limit of 120C.

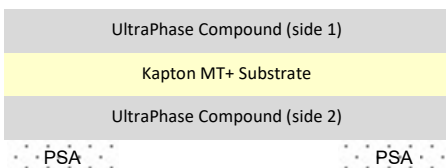
LT05 = 0.0005" (0.13mm) thick microsphere pressure sensitive (re-positionable / light tack)

T20 = 0.002" (0.51mm) thermally conductive pressure sensitive

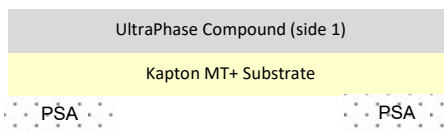
UltraPhase 60A Pre-Apply Attachment Options (Discrete PSA Placement)

Note: Discrete placement designed for applying PSA outside of primary thermal via so thermal performance will not be impacted.

Discrete PSA Placement on Compound

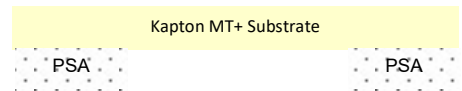


Discrete PSA Placement on Uncoated Side



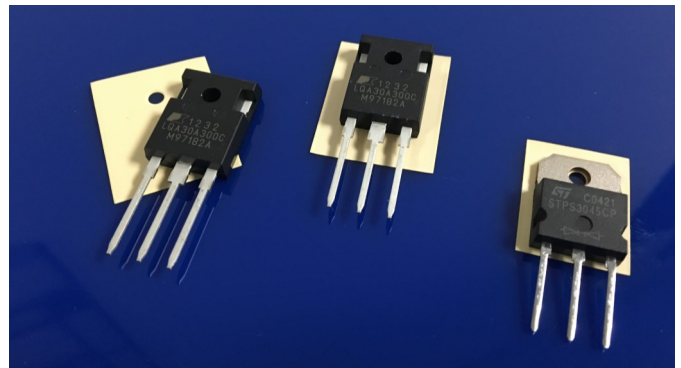
Uncoated Substrate Die Cut

Polyimide substrate only available as die cut to be used as a thermal shim with no phase change compound coating.



Application Re-Work / Clean Up

Reworking your application with UltraPhase 60 is simple. Detach your device from its heat sink or case sink and remove the pad. Depending on the amount of UltraPhase compound left on your application surface, introduction of new UltraPhase 60 material may be required when re-assembling. UltraPhase compound residue on the application surface can be cleaned up using mineral spirits solvent or isopropyl alcohol and a cloth towel. Other clean up methods include slightly heating the compound and gently wiping away softened unwanted compound. **For best results, make sure all application surfaces are clean and free of debris before applying a new UltraPhase Pad.**



UltraPhase 60 Physical Properties / Form Characteristics

Characteristic	UltraPhase 60
Base Formulation (Compound)	Proprietary
Phase Change Temperature	60°C / 140°F
Viscosity @ Phase Change	Thixotropic
Overall Thickness Tolerance	Target Thickness +/- 10% (typical)
UltraPhase 60 Color	Tan / Yellow
Separator Liner / Color	Paper / White
Available Formats	Master Rolls / Slit Rolls / Die Cuts (piece or reels)
Maximum Master Roll Width	15.500" (39.4cm)
Standard Master Roll Lengths	25ft / 50ft / 100ft / 250ft / 500ft (3.00" ID Core)
Custom Roll Lengths and Widths Available	Yes (customer defined)
Standard Sheet Sizes	12.0" x 15.5" (30.5cm x 39.4cm)
Custom Sheet Lengths and Widths Available	Yes (customer defined)
TIMTEL Die Cutting Capabilities	Steel Rule Die / Flexible Die / Rotary Die / Laser Cutting
Typical TIMEL Die Cut Delivery Formats	Individuals, Multiples on a card, or Continuous Reel
Typical TIMTEL Die Cut Dimensional Tolerance	0.005" (0.13mm) to 0.010" (0.25mm) (determined at review)

DuPont Kapton MT+	150MT +	200MT+
Specific Properties	Timtel Substrate ID KP1.5	Timtel Substrate ID KP2
Tensile Strength	12.8 kpsi	12.5kpsi
ASTM D882	(88 MPa)	(86 MPa)
Modulus	609 kpsi	624 kpsi
ASTM D882	(4.2 GPa)	(4.3 GPa)
Elongation	52%	48%
ASTM D882		

Figures reported above are per DuPont reported data for Kapton MT+ Film. Visit DuPont's website at www.dupont.com or contact TIMTEL for more information.

DuPont Kapton MT General Properties	Result
Dielectric Constant (@ 1MHz) (ASTM D150)	~ 4.0
Volume Resistivity (ASTM D257)	> 10 ¹⁵ ohm-cm

Figures reported above are per DuPont reported data for Kapton MT+ Film. Visit DuPont's website at www.dupont.com or contact TIMTEL for more information.

Thermal Outgassing (UltraPhase Compound Only)	Result
Total Mass Loss, % TML	0.138
Collectible Volatile, Condensable Matter, % CVC	0.130
Water Vapor Gain, % WVR	0.021

Note: Thermal outgassing test performed per ASTM E595-93 using thermal compound formulation only. Due to no outgassing, UltraPhase 60 is suitable for aerospace application.

UltraPhase 60 Storage & Shelf Life	Result
Storage Condition and Temperature	Cool Dry Location at or below 95°F / 35°C
Shelf Life	2 years from the data of manufacture
Transit Methods / Conditions	Due to temperature sensitive design of our thermal materials, it is recommended to ship air freight during warmer months to prevent phase-change of thermal compound during long ground transit conditions within elevated temperature environments (May through September)

UltraPhase 60 Sample Sheet and Die Cut Prototypes

Thermal material evaluation is always critical when designing in a new thermal material. Sheet samples of UltraPhase 60 are available for preliminary testing. Testing die cut prototype UltraPhase 60 pads within the scope of your required outline is available without the need for incurring a die cut tooling charge. Nominal sample charge may apply depending on part detail and prototype quantity needed.