THERMAL COMPOUNDS, ADHESIVES AND INTERFACE MATERIALS

120 SERIES

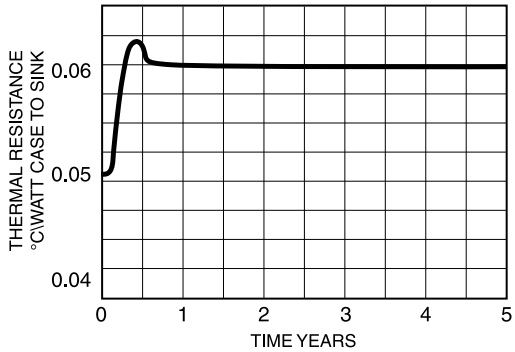
The **120 Series** Silicone Oil-Based Thermal Joint Compound fills the minute air gap between mating surfaces with a grease-like material containing zinc oxide in a silicone oil carrier. It possesses an excellent thermal resistance of only 0.05°C/W for a 0.001 in. film with an area of one square inch. There is no measurable increase in case temperature of a mounted semiconductor on a heat sink after the 6-month stabilization period (Time versus Thermal Resistivity graph below).

TYPICAL VALUES FOR THERMAL RESISTANCE, CASE TO SINK ($Ø_{CS}$) WHEN THERMAL JOINT COMPOUNDS ARE USED

Case Style Characteristics	Mounting Torque in inch • pounds (N•M)	Typical Thermal Resistance (°C/W)
T0-3	8 (0.9)	0.09
TO-66	9 (0.9)	0.14
TO-220	8 (0.9)	0.50
0.19 (4.8) stud x 0.44 (11.2) hex	15 (1.7)	0.16
0.25 (6.4) stud x 0.69 (17.5) hex	30 (3.39)	0.10
0.38 (9.7) stud x 1.06 (26.9) hex	75 (8.47)	0.07
0.50 (12.7) stud x 1.06 (26.9) hex	125 (14.12)	0.07
0.75 (19.1) stud x 1.25 (31.8) hex	600 (67.79)	0.052

120 SERIES - THERMAL JOINT COMPOUND

Characteristic	Description
Volume Resistivity	5 X 10^{14} ohm-cm
Dielectric Strength	225 volts/mil
Specific Gravity	2.1 min.
Thermal Conductivity @ 36°C	0.735 W/(m)(K) 5.1(Btu) (in.)/(hr)(ft^2)(°F)
Thermal Resistivity (P)	56 (°C)(in.)/watt
Bleed, % after 24 hrs @ 200°C	0.5
Evaporation, % after 24 hrs @ 200°C	0.5
Color	opaque white
Shelf life	5 years
Operating Temperature Range (°C)	-40/+200



120 SERIES - ORDER GUIDE

Series - P/N	Container Size
120-SA	4 gram plastic pak
120-2	2 oz (0.06 kg) jar
120-5	5 oz (0.14 kg) tube
120-8	8 oz (0.23 kg) jar
120-80	5 lb (2.27 kg) can
120-320	20 lb (9.08 kg) can

HIGH PERFORMANCE THERMAL COMPOUND

122 SERIES

122 Series Thermal Joint Compound is a stable, silicone based, thixotropic paste developed to provide premium performance at an affordable price. It is formulated to significantly reduce contact thermal resistance where power densities are concentrated in devices such as flip chip, reduced die size, and 'overclock' microprocessors. When applied as a thin film between a Wakefield heat sink and device it possesses superior thermal conductivity compared to traditional 'grease'. It is compatible with automated or manual dispensing methods and is fully RoHS compliant.

122 SERIES THERMAL JOINT COMPOUND

Typical Characteristics	Description
Appearance	Smooth Gray paste
Thermal Conductivity	2.5 W / m °K, 17.3 (Btu) (in.)/(hr) (ft^2) (^{0}F)
Thermal Resistance	0.02 °C in 2 / W
Bleed	0.015 wt%, 24 hrs at 200°C
Evaporation	0.150 wt%, 24 hrs at 200°C
Volume Resistivity	1.4 x 10^{10} ohm-cm
Dielectric Strength	225 volts/mil
Specific Gravity	2.23 (gm/cc) at 25°C
Operating Range	-40°C to 205°C
Shelf Life	5 years

122 SERIES - ORDER GUIDE

Series - P/N	Container Size
122-10CC	10cc syringe
122-2	2 oz (0.06 kg) jar
122-30CC	30cc syringe

THERMAL COMPOUNDS, ADHESIVES AND INTERFACE MATERIALS

126 SERIES

The **126 Series** is a nontoxic, synthetic, ester-based (nonsilicone) Thermal Joint Compound with metal oxide fillers designed to enhance thermal performance characteristics of plastic and metal package devices exceeding that of silicone-based compounds. Solved are problems associated with contamination of wave solder baths and migration of silicone-based products. Shelf life: 5 years.

126 SERIES THERMAL JOINT COMPOUND	
Characteristics	**Description**
Appearance	Smooth, white homogeneous paste
Solids Content, wt %	65% min
Thermal Conductivity at 36°C	.69 W / m °K, 4.8 (Btu)(in.)/(hr) (ft²) (°F)
Interface Thermal Resistance	0.043°C/W TO-3 at 0.0008 thick film
Bleed, 24 hrs at 200°C, wt%	0.09% max
Evaporation, 24 hrs at 200°C, wt%	0.6 max
Volume Resistivity	2.3×10^{12} ohms-cm
Dielectric Strength	200 volts/mil
Specific Gravity @ 60°F	2.93 (gm/cc)
Penetration	280 to 320
Operating Range	-40°C to 200°C

126 SERIES - ORDER GUIDE	
Series - P/N	**Container Size**
126-2	2 oz (0.6 kg) jar
126-4	4 oz (0.11 kg) tube
126-4S	4 oz (0.11 kg) syringe
126-5LB	5 lb (2.27 kg) can

DeltaBond™ 152

DeltaBond™ 152 adhesive is ideal for general cementing; thermally bonding semiconductors and components to chassis or heat sinks, while electrically isolating one from the other; fabricating heat sinks or thermal links; and for all permanent bonding of assemblies which require high thermally conductive interfaces. It produces a rigid, high strength bond to most materials when cured. **DeltaBond™ 152** is available in bi-packs, kits, and quarts. Order one bottle of hardener A-4 or B-4 per one quart of **DeltaBond™ 152** separately. Shelf life: 152KA 1 year, all others 2 years.

DELTABOND™152			
Characteristics		**Hardener Type**	
Typical Properties Fully Cured		**A4**	**B4**
Thermal conductivity - W/(m) (°K)		0.836	0.908
(Btu) (in.)/(hr) (ft²) (°F)		5.8	6.3
Thermal resistivity - (°C) (in.)watt		47	42
Bond shear strength 1 in. overlap - psi etched aluminum to etched aluminum	77°F	2,900	2,300
	125°F	2,200	2,000
	212°F	400	800
Heat distortion point - °F		130	225
Minimum dielectric strength, v/mil, 0.125 in. sample		400	400
Max operation temp - °C	Continuous	65	150
	Intermittent	100	190

DELTABOND™152		
Mixing Proportions and Working Properties		
Characteristics	**A4**	**B4**
Parts of hardener per 100 parts of resin by weight	7.5	3.5
*Working Time - at 77°F	45 min	30 min
†Initial cure time 77°F	8 hrs	6 hrs
150°F	45 min	30 min
250°F	20 min	15 minn
‡Post-cure time at a temp in °F	4 hrs @200°F	4 hrs @ 200°F
‡Alternate room temp. aging time at 77°F	4 days	4 days
Working consistency (77°F)	viscous liquid	paste
Working viscosity (77°F) cps	25,000	—

Model Number	DELTABOND™152 Ordering Guide - Resin and Hardener		
	Resin		Hardener
	Part No.	**Container**	**Part Number**
DeltaBond™ 152	152-1A	Bi-Pack (1 oz)	Included in PIN 152-1 A ("A-4") Type
	152-1B	Bi-Pack (1 oz)	Included in P/N 152-1 B ("B-4") Type
	152-KA	Kit (7 oz Resin, 0.5 oz Hardener)	Included in P/N 152-KA
	152-Q	1 quart (4 lbs)	A-4 (0.316 lb), B-4 (0.14 lb), (order 1 only)

All hardener part numbers A-4, B-4

NOTES:

* *Since the hardener/resin reaction is exothermic, it is important that batch size be matched to hardener speed. Working times given are for approximate batch sizes: A—200 gms, B—200 gms. Larger batch sizes will greatly reduce working time.*

** *For optimum electrical properties, dry parts for 15 minutes at 150°F (65°C) or 30 minutes at 75°F (24°C) to slowly evaporate the thinner and then final cure for 4 hours at 275°F (135°C).*

† *After initial cure, material may be handled, removed from fixture, etc., but has not yet achieved full properties and should be room temperature aged or post-cured as shown to achieve full physical and electrical properties.*

‡ *After initial cure, material may be brought to full physical and electrical properties during post-cure or may be room temperature aged for charted length of time to achieve same full properties.*

The information contained herein is based on data believed to be reliable but we do not assume responsibility for accuracy. All such information is used at the customer's own risk, conditions of use being beyond our control.

THERMAL COMPOUNDS, ADHESIVES AND INTERFACE MATERIALS

DeltaBond™ 153

DeltaCast™ 153 is a pourable casting resin having thermal expansion characteristics similar to aluminum and copper allowing assemblies to operate over a very wide temperature range. Ideal for encapsulating components and assemblies, this series' major advantages and uses include potted systems (virtually indestructible), protecting components and systems from moisture and contaminants, securing proprietary circuitry, mechanical support of devices, removal of heat from hot components and the assembly equalizing temperatures, and high voltage isolation. **DeltaCast™ 153** is available in quarts and gallons. Order one bottle of hardener A4 or B4 per one quart of **DeltaCast™ 153** separately. Shelf life: 2 years.

DELTACAST™153			
Characteristics		Hardener Type	
Typical Properties Fully Cured		A4	B4
Thermal conductivity -			
W/(m) (°K)		0.836	0.908
(Btu) (in.)/(hr) (ft²) (°F)		5.8	6.3
Thermal resistivity - (°C) (in.)watt		47	42
Bond shear strength 1 in. overlap - psi etched aluminum to etched aluminum	77°F	2,500	1,900
	125°F	—	—
	212°F	—	—
Heat distortion point - °F		130	225
Minimum dielectric strength, v/mil, 0.125 in. sample		400	400
Max operation temp - °C	Continuous	65	150
	Intermittent	100	190

DELTACAST™153		
Mixing Proportions and Working Properties		
Characteristics	A4	B4
Parts of hardener per 100 parts of resin by weight	7.5	3.5
*Working Time - at 77°F	45 min	30 min
† Initial cure time 77°F	8 hrs	6 hrs
150°F	45 min	30 min
250°F	20 min	15 minn
‡Post-cure time at a temp in °F	4 hrs @200°F	4 hrs @ 200°F
‡Alternate room temp. aging time at 77°F	4 days	4 days
Working consistency (77°F)	heavy liquid	viscous liquid
Working viscosity (77°F) cps	10,000	30,000

Model Number	DELTACAST™153 Ordering Guide - Resin and Hardener		
	Resin		Hardener
	Part No.	Container	Part Number
DeltaCast™ 153	153-Q	1 quart (4 lbs)	A-4 (0.316 lb), B-4 (0.14 lb), (order 1 only)

All hardener part numbers A-4, B-4

DeltaBond™ 154

DeltaBond™ 154 is a medium viscosity, aluminum-filled resin with the best thermal conductivity of this series. It is, however, neither a good electrical insulator nor conductor. Its principal application is that of a good thermal mechanical adhesive for applications such as bonding fins to base plates or structural mounting blocks or brackets to heat sinks. Order one bottle of hardener A4 or B4 per one quart of **DeltaBond™ 154** separately. Shelf life: 2 years.

DELTABOND™154			
Characteristics		Hardener Type	
Typical Properties Fully Cured		A4	B4
Thermal conductivity -			
W/(m) (°K)		1.053	1.154
(Btu) (in.)/(hr) (ft²) (°F)		7.3	8.0
Thermal resistivity - (°C) (in.)watt		37	34
Bond shear strength 1 in. overlap - psi etched aluminum to etched aluminum	77°F	3,000	2,400
	125°F	2,300	2,100
	212°F	500	800
Heat distortion point - °F		130	225
Minimum dielectric strength, v/mil, 0.125 in. sample		NA*	NA*
Max operation temp - °C	Continuous	65	150
	Intermittent	100	190

DELTABOND™154		
Mixing Proportions and Working Properties		
Characteristics	A4	B4
Parts of hardener per 100 parts of resin by weight	11.0	4.5
*Working Time - at 77°F	45 min	30 min
† Initial cure time 77°F	8 hrs	6 hrs
150°F	45 min	30 min
250°F	20 min	15 min
‡Post-cure time at a temp in °F	4 hrs @200°F	4 hrs @ 200°F
‡Alternate room temp. aging time at 77°F	4 days	4 days
Working consistency (77°F)	viscous liquid	paste
Working viscosity (77°F) cps	25,000	—

Model Number	DELTABOND™154 Ordering Guide - Resin and Hardener		
	Resin		Hardener
	Part No.	Container	Part Number
DeltaBond™ 154	154-Q	1 quart (2.5 lbs)	A-4 (0.316 lb), B-4 (0.14 lb), (order 1 only)

All hardener part numbers A-4, B-4

THERMAL COMPOUNDS, ADHESIVES AND INTERFACE MATERIALS

DeltaBond™ 155

DeltaBond™ 155 is an epoxy adhesive formulated for use within the semiconductor industry. An easy to mix spread thixotropic paste, it offers high heat transfer, low shrinkage, and a coefficient of thermal expansion comparable to that of copper and aluminum. This adhesive is principally used to form thermally conductive joints in fabricated heat sinks and between heat sinks and power devices. When used to bond semiconductors to heat sinks, it also serves as an electrical insulator. Its strong bond to a wide variety of substrates resists severe temperature cycling. **DeltaBond™ 155** is only available in kit size. Simply squeeze out equal lengths and mix to uniform color. Shelf life: 1 year.

DELTABOND™155		
Characteristics		**Hardener Type DeltaBond™155**
Typical Properties Fully Cured		
Thermal conductivity - W/(m) (°K)	0.836	
(Btu) (in.)/(hr) (ft²) (°F)		5.8
Thermal resistivity - (°C) (in.)watt		47
Bond shear strength 1 in. overlap - psi etched aluminum to etched aluminum	77°F	2,600
	125°F	—
	212°F	—
Heat distortion point - °F		130
Minimum dielectric strength, v/mil, 0.125 in. sample		400
Max operation temp - °C	Continuous	65
	Intermittent	100

DELTABOND™155	
Mixing Proportions and Working Properties	
Parts of hardener per 100 parts of resin	by volume 100
*Working Time - at 77°F	90 min
†Initial cure time 77°F	8 hrs
150°F	45 min
250°F	20 min
‡Post-cure time at a temp in °F	4 hrs @ 200°F
‡Alternate room temp. aging time at 77°F	4 days
Working consistency (77°F)	paste
Working viscosity (77°F) cps	paste

DELTABOND™155			
Model Number	**Ordering Guide - Resin and Hardener**		
	Resin		**Hardener**
	Part No.	**Container**	**Part Number**
DeltaBond™ 155	155	Kit (3 oz resin, 3 oz hardener)	Included in P/N 155

DeltaBond™ 156

DeltaBond™ 156 Thermally Conductive Adhesive is a modified acrylic adhesive designed for permanent mounting on components where heat must be effectively transmitted. Recommended for electromechanical assemblies to bond components and dissipate heat, it replaces mechanical fasteners and compressible pads, silicone grease, and epoxies; eliminates air entrapment, and other variables related to epoxy mixing. This soft paste requires no mixing and flows easily to allow thin bond lines. Primer activated, cure begins upon assembly. DeltaBond™ Activator fixtures at room temperature in less than 5 minutes. Full strength is developed in 4 to 12 hours and fillets become dry to the touch in 24 hours. It is not recommended to use this durable adhesive without the use of DeltaBond™ Activator. **DeltaBond™ 156** is available in kit size; order 156-K (25 ml Syringe and Activator Kit). Shelf life: 1 year.

DELTABOND™156		
Characteristics	**Description**	
Typical Properties Fully Cured		
Test	**Results**	**ASTM**
Temperature Range	-65 to 300°F (-54 to 149°C) 300°F to (177°C) Intermittent	
Tensile Strength, at break	2360 psi	D638
Modulus	233,000 psi	D638
Elongation, at break	7.75%	D638
Outgassing	2.5% TLM 0.05% CVCM	E595
Coefficient of Thermal Expansion	7.1 x 10^{-4} (cm/cm°C)	
Tensile Shear	2500psi	D1002
Thermal Conductivity, K (absolute at 86°F (30°C)	3.47 Btu x in./hr ft² °F (0.50 W/m °C)	

Note: *The absolute thermal conductivity test was developed specifically for measuring thermal properties of thin film adhesive bonds.*

DELTABOND™156		
Typical Electrical Properties		
Test	**Results**	**ASTM**
Dielectric Strength	220 volts/mil	D149
Dielectric Constant, 77°F (25°C)		D150
100 Hz	14.92	
1000 Hz	14.26	
1MM Hz	12.34	
Dissipaton Factor, 77°F (25°C)		D150
100 Hz	0.05	
1000 Hz	0.03	
1MM Hz	0.06	
Volume Resistivity	5.2x10^{11} (ohms-cm)	D257
Surface Resistivity	8.6 x 10^{13} (ohms)	D257

Note: *DeltaBond™ Thermally Conductive Adhesive-High Strength contains a metallic filler which, in certain applications, may have an effect on electrical properties. Therefore, test each particular application to ensure that electrical properties are as required.*

Model Number	DELTABOND™156		
	Ordering Guide - Resin and Hardener		
	Resin		**Hardener**
	Part No.	**Container**	**Part Number**
DeltaBond™ 156	156-K	Resin Kit Hardener Syringe - 0.85 fl oz - 25 ml - 2 oz net/0.44 oz fl contents bottle -12ml	Included in kit hardener with brush applicator - 4.2 oz total wt/kt

* *Since the hardener/resin reaction is exothermic, it is important that batch size be matched to hardener speed. Working times given are for approximate batch sizes: A—200 gms, B—200 gms. Larger batch sizes will greatly reduce working time.*

† *After initial cure, material may be handled, removed from fixture, etc., but has not yet achieved full properties and should be room temperature aged or post-cured as shown to achieve full physical and electrical properties.*

‡ *After initial cure, material may be brought to full physical and electrical properties during post-cure or may be room temperature aged for charted length of time to achieve same full properties.*

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THERMAL COMPOUNDS, ADHESIVES AND INTERFACE MATERIALS

The 173, 174, and 175 Series are highly efficient thermally conductive insulators designed for semi - conductor interface to heat sinks. Their properties eliminate messy concerns associated with thermal greases.

173/174 SERIES *DeltaPads™ Thermally Conductive Insulators*

TO-3, TO-66, TO-220,DO-4, DO-5 SHEET

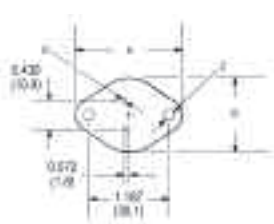
175 SERIES *Greaseless Thermally Conductive Kapton® Reinforced Insulators*

Characteristics	DeltaPads™ 173-7 Series	DeltaPads™ 173-9 Series	DeltaPads™ 174-9 Series	Kapton® 175-6 Series	Test Method
Material Thickness	0.007 in.	0.009 in.	0.009 in.	0.006 in.	Micrometer
Color	Gray	Gray	Tan	Gray	Visual
Tear Strength, lb/in. Typical100	100	100	100	ASTM 0624	
Volume Resistivity, megohm-cm, Minimum Normal	1.0×10^{9}	1.0×10^{9}	1.0×10^{13}	1×10^{13}	ASTM D257
Breakdown Voltage, Minimum	4,000	5,000	5,000	6,000	ASTM 0149
Dielectric Constant at 60 Hz and 100 V Maximum	2.70	2.40	2.50	5.5 @ 1,000 Hz	ASTM D 150
Continuous Use Temperature, °C	-60/+200	-60/+200	-60/+200	-60/+200	–
Thermal Conductivity, cal/cm sec. °C, Minimum	3×10^{-3}	3×10^{-3}	1×10^{-2}	1.2×10^{-3}	–
Thermal Resistance (TO-3), 1 in.^{2} °C/W	0.33	0.50	0.25	0.40	–
Recommended Mounting Pressure, lb/in.^{2}	350/550	350/550	350/550	350/550	Formula*

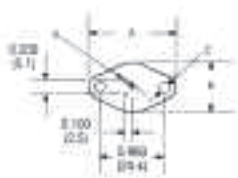
$$*P \text{ (pressure in psi)} = \frac{T \text{ (torque [in.-lb]} \times N \text{ (number of fasteners)}}{0.2 \times D \text{ (Thread Dia)} \times A \text{ (contact surface area square inches)}}$$

173-7 Series		173-9 Series	174-9 Series	175-6 Series
No Adhesive	Adhesive Backing	No Adhesive	No Adhesive	Greaseless
–	–	173-9-210P	–	175-6-210P
173-7-220P	–	–	–	175-6-220P
173-7-230P	–	173-9-230P	–	175-6-230P
173-7-240P	173-7-240A	173-9-240P	–	175-6-240P
–	–	–	–	175-6-250P
–	–	–	–	175-6-280P
–	–	–	174-9-310P	175-6-310P
–	–	–	–	175-6-320P
–	–	–	–	175-6-330P
–	–	–	–	175-6-410P
–	–	–	–	175-6-610P
173-7-1212P	–	173-9-1212P	174-9-1212P	–

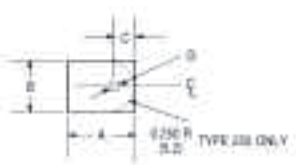
MECHANICAL DIMENSIONS



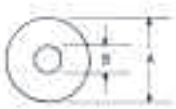
TO-3



TO-66

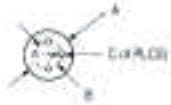


TO-220



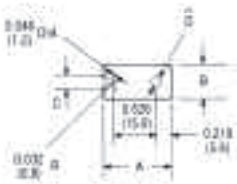
DO4/05

SHEET



TO-5

DUAL TO-220



TO-66 (RECTANGLE)

Dimensions: in. (mm)

OCEAN CHIPS
Океан Электроники
Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения **«JONHON»**, а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов **«FORSTAR»**.

AVIC JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

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