Pulse Heated
Thermode Selection Guide

THEORY OF OPERATION:

The resistance of the thermode to the flow of electrical current produces the heat required to melt the solder and create the connection. As the electrical energy flows through the thermode, the heat generated is conducted directly to the workpiece. Since most of the electrical current passes through the thermode, there is little chance of electrical damage to the workpiece.

After the reflow temperature is reached and the solder has flowed sufficiently, the current is terminated. The thermode remains in contact with the parts just long enough for the solder to solidify.

The size and thermal properties of the workpiece directly affect the amount of heat required. This is why thermodes incorporate a thermocouple which provides temperature data to a closed loop heating system (UF-4000A).

The pulse heated control performs the following functions during the soldering process:

- Detects when the mechanical system (head) has applied the programmed pressure of the thermode to the parts.
- Rapidly heats the thermode.
- Maintains the preset temperature for a precise time to achieve a quality joint.
- At the end of the cooling period, the control signals the head to retract the thermode from the parts when the joint has solidified.

The temperature of a pulse heated thermode will normally be at ambient when it contacts the parts. A quality thermode should be capable of heating itself and the portion of the workpiece it contacts in a very short time. Because of its low thermal mass, the thermode heats and cools rapidly. The amount of energy transferred to the part by the thermode should be of the same order of magnitude as the energy required to reflow the solder.

THERMODE SELECTION

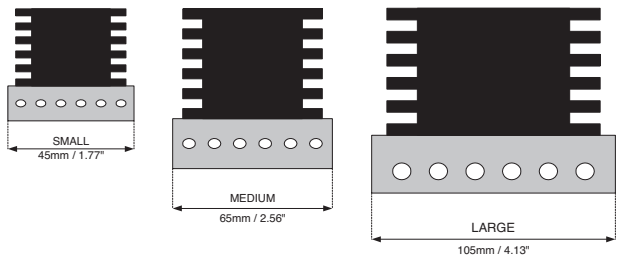
- Wide variety of tip shapes and sizes
- Uniform heating
- Dimensionally stable

AMADA WELD TECH offers a variety of thermodes for different applications. In order to optimize the transfer of thermal energy from the thermode to the part, the thermode footprint should equal or exceed the size of the part. If a part is thermally more conductive than the thermode, the thermode may not be able to reach reflow temperature.

Thermode life is dependent on set point temperature. Brazed construction offers increased operating life.

HOT BAR REFLOW SOLDERING MOUNTING BLOCKS FOR THREE-DIMENSIONAL THERMODES (TD)

This range of thermode mounting blocks will fit on all TL-080B, TL-084B and TL-180B series weld heads and is standard with the TL-087B-SA/REFLOW, TL-087B-EZ and TL-087B-F. The robust design allows efficient heat dissipation for applications with high repetition rates. The design also facilitates efficient current transfer to the thermode, thus allowing fast heat-up and cool-down, and therefore the shortest process times. A nozzle for cooling air is fitted and a cooling module can be ordered specially to fit to the UF-4000A control.



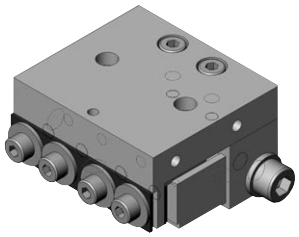
Mounting Blocks

The SMALL block (P/N: 17TDSB177) is standard on the TL-087B-SA/REFLOW
The MEDIUM block (P/N: 17TDMB256) is standard on the TL-087B-EZ
The LARGE block (P/N: 17TDLB413) is standard on the TL-087B-F

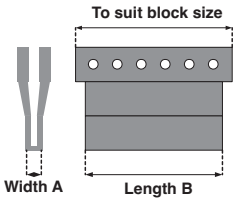
QUICK CONNECT BLOCKS (QCB) FOR THERMO-PLANE THERMODES

This range of thermode QCBs will fit on all SH-80A and SH-500A series weld heads. The QCB and Thermo-Plane Thermode are designed to be used as a set. The set is ground to optimize co-planarity resulting in the best quality of product bonds. The set also enables fast exchange of the Thermode in mid-production without further adjustment. The special shaft design of the QCB guarantees repeatable position of the thermode.

Quick Connect Block (QCB)



17TD THREE DIMENSIONAL THERMODE



The TD (three-dimensional) family is a range of thermodes designed to give optimum performance in the production environment.

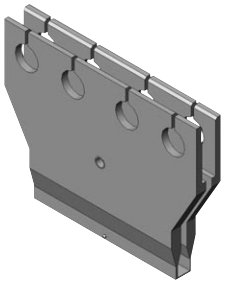
Superior thermode design is key to process quality and consistency. Use of advanced material technology combined with highly accurate manufacturing techniques has produced a thermode with outstanding consistency of heat transfer to the parts. Precision design has resulted in a complete range of thermodes to suit every application.

Key performance criteria:

- Uniform temperature distribution across thermode face.
- Optimal flatness under heating.
- No voltage potential which may damage sensitive components.
- Fastest heating and cooling rates to deliver short process times.
- K type thermocouple. Types J & E optional.

17	TD	S	1000	059
Thermode Family	Three Dimensional	Block Size	Thermode Length	Thermode Width

THERMO-PLANE THERMODES



Thermoplane thermodes are specially designed for ultra-fast heating and cooling cycles, minimizing process times. Forced air-cooling further speeds the bonding process. Thermodes are designed to maintain co-planarity and withstand the deformation that can result from the high forces that may be necessary in the bonding process. The Thermo-Plane Thermode eliminates voltage drop as current flows through the Thermode from front-to-back instead of left-to-right, preventing damage to the parts when soldering.

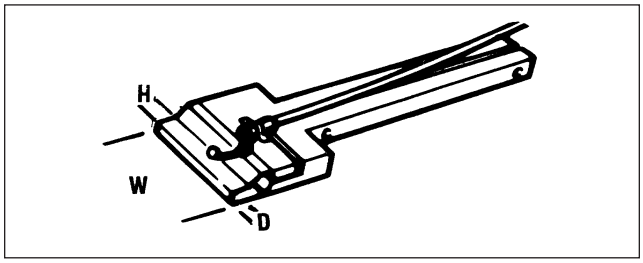
69T	50	20
Thermode Family	Thermode Width	Thermode Length

Thermodes up to 50 mm fit on 69Q0001.

Thermodes up to 100 mm fit on 69Q0002.

Thermodes up to 150 mm fit on 69Q0003.

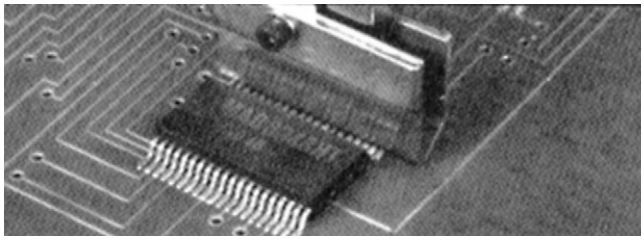
17F MULTIPLE LEAD FOLD-UP THERMODE



- **Application –** Reflow solder voltage sensitive components using fold-up thermode. Maximum gradient across the tip is .050 volts.
- Face sizes range from 0.25 to 1.00 inches wide.
- Nichrome alloy construction maintains flatness at operating temperature.
- Rigid copper holders ensure uniform heat and voltage across the tip.
- Welded construction for long life.
- Limited to reflow soldering at set point temperatures under 350º C.
- J type thermode (K & E Optional).

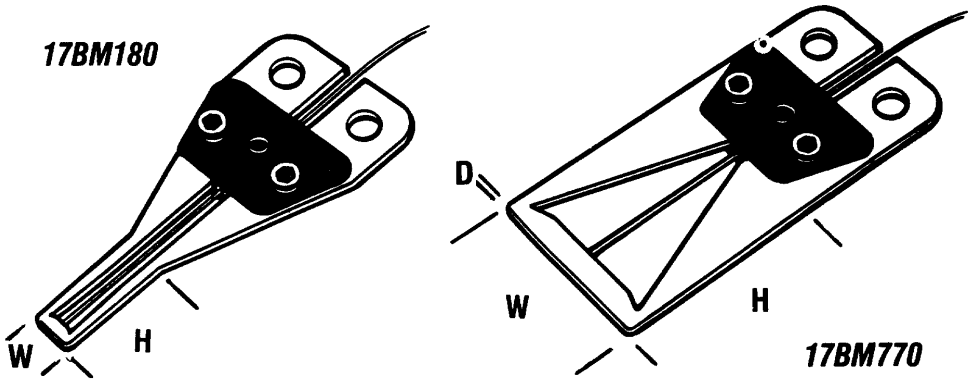
Thermode	W (inch)	D (inch)
17F250	.250	.075
17F350	.350	.075
17F380	.375	.075
17F550	.563	.075
17F750	.750	.075
17F1000	1.000	.075

Note: Mounts to TL-087B or TL-087B-F head

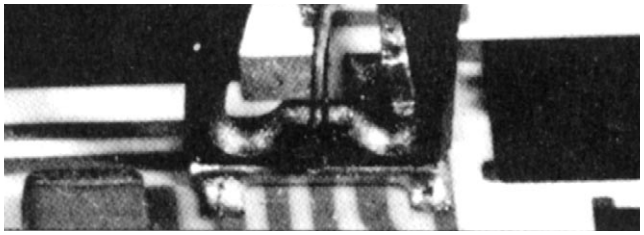


Reflow soldering multiple flat pack leads with multiple lead fold-up thermode. The fold-up design is electrically compatible with voltage sensitive components.

17BM MULTIPLE LEAD BLADE THERMODE



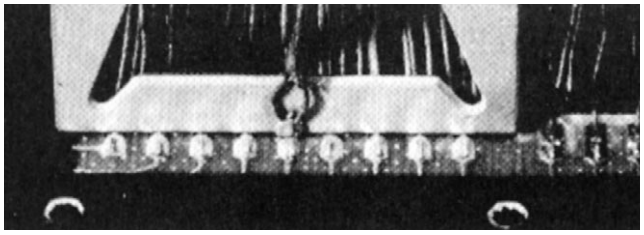
- **Application –**Use tips up to .220 inches wide for bonding subminiature components to rigid substrates. Tips up to 1.00 inch wide can bond multiple fine wire and small ribbon cable to rigid substrates.
- Long length-to-width ratio makes this thermode ideal for reaching over components and into crowded spaces.
- Low cost etched construction with thermocouple feedback and strain relief.
- Profiled tip ensures even heat distribution.
- J type thermocouple (K & E type optional).



Reflow solder copper bus wire to circuit board pads in a single operation using .220 wide blade thermode.

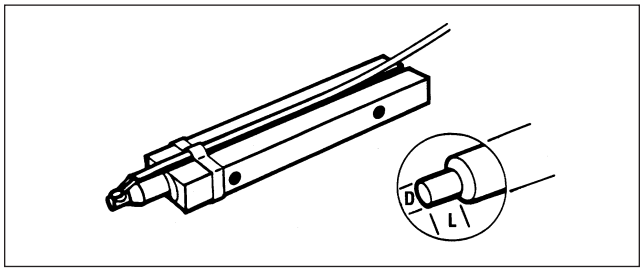
Thermode	Material	W (inch)	D (inch)
17BM070	Molybdenum	.075	.030
17BM180	Molybdenum	.220	.030
17BM360	Molybdenum	.400	.030
17BM770	Molybdenum	.810	.030
17BM870/30	Molybdenum	.870	.030
17BM1000	Molybdenum	1.000	.030

Note: Mounts to LT-050B-A, LT-050B-F, TL-087B-F, and TL-087B-EZ heads.



Bond fine wires to circuit board pads using .770 inch wide blade thermode.

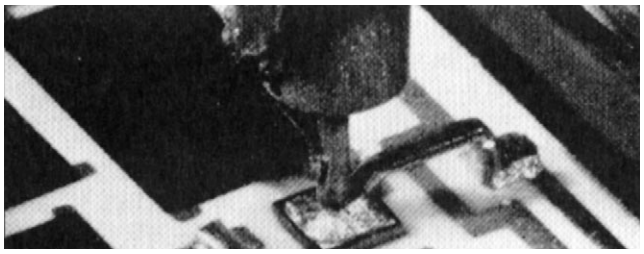
17P SINGLE POINT PEG TIP THERMODE



Thermode	D (inch)	L (inch)
17P20	.020	.070
17P40	.040	.070
17P50	.050	.200
17P75	.075	.070
17P93	.093	.250

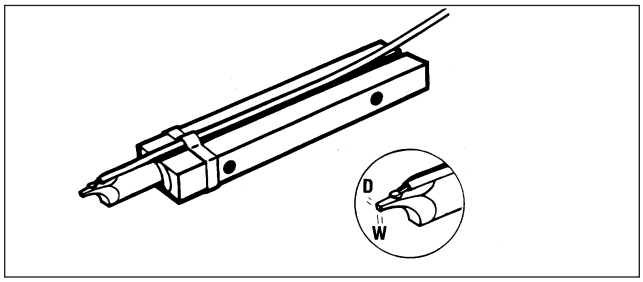
Note: Mounts to LT-050B-A, LT-050B-F, TL-087B-F, and TL-087B-EZ heads.

- **Application –** Reflow solder subminiature electronic components or small wires to rigid or semi-rigid substrates.
- Peg shape tip provides excellent accessibility.
- Face diameters from .020 to .093 inches.
- Thermocouple feedback. High temperature plastic strap provides protective strain relief for thermocouple attachment.
- Brazed tungsten construction for long life.
- J type thermocouple (K & E type optional).



A 17P20 peg tip thermode reflow solders a plated contact and bus bar to pads on ceramic substrate.

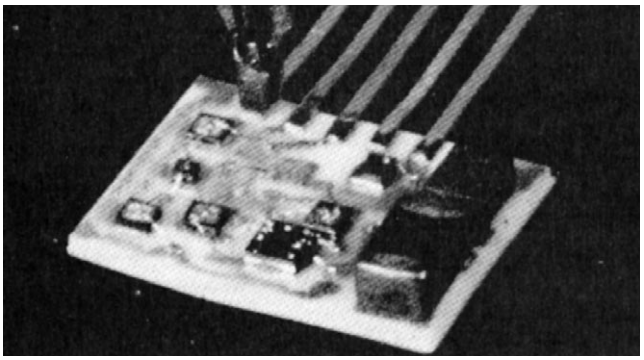
17 "T" TIP THERMODE



Thermode	D (inch)	W (inch)
17T08/10	.010	.008
17T085/25	.025	.008

Note: Mounts to LT-050B-F/LRF and TL-087B-F heads.

- **Application –** Bond ribbon or wire to rigid or semi-rigid substrates.
- Smallest footprint thermode available.
- Thermocouple feedback. High temperature plastic strap provides protective strain relief for thermocouple attachment.
- Brazed tungsten construction for long life.
- J type thermocouple (K & E type optional).
- Other sizes available on special order.



Thermocompression bonding gold leads to gold substrate pads is an easy task for the "T" tip thermode.

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