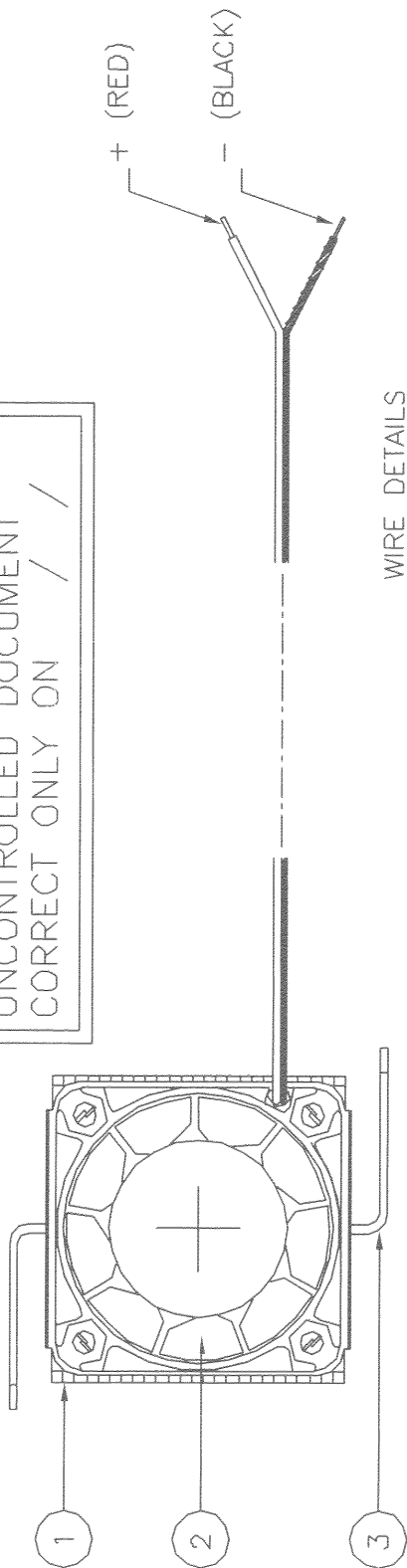


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UNCONTROLLED DOCUMENT
CORRECT ONLY ON / /

DO NOT SCALE IF IN DOUBT ASK



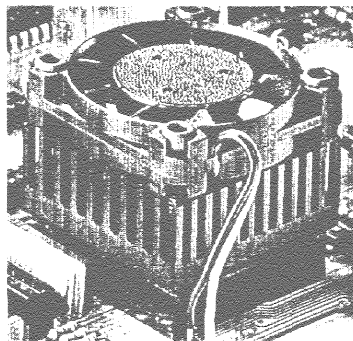
WIRE DETAILS

ITEM	COMPONENT CODE	DESCRIPTION	OFF
1	2321B	PIN FIN HEATSINK	1
2	0410N-12	SHICOH FAN	1
3	PF17	SPRING CLIP	1
4	20287	F40 FAN CLIP	1
5	8317	PIN GRID ARRAY FRAME	1

PGA DEVICE
SUPPLIED BY
OTHER

PART NO 2321B-TCM42S-FS		ECF 1112 REFERS				
TITLE TCM ASSEMBLY		DRAWN TKO	TRACED	CHECKED	APPROVED	DATE 13/08/98
Redpoint Thermalloy Ltd		THIS DOCUMENT CONTAINS REDPOINT THERMALLOY LTD'S INTELLECTUAL PROPERTY WHICH IS SUPPLIED IN CONFIDENCE AND WHICH MUST NOT BE USED FOR ANY PURPOSE OTHER THAN WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED WITHOUT WRITTEN PERMISSION FROM THE OWNERS				
ISSUE	DESCRIPTION	APPRO DATE				
2	FAN CLIP CORRECTED	TO 27/8/98				
1	ORIGINAL	TO 8/98				
DRAWING NO. ZA6217						

TCM®: Thermalloy Cooling Modules For Microprocessors



Innovative TCM®: High performance pin fin heat sink with DC fan attached

- Significant volumetric efficiency improvement with direct impingement down airflow.
- Thermal performance approaching recirculated liquid.
- High performance with low cost.
- Available in 5 or 12 volt versions.
- DC brushless, ball-bearing fan with life expectancy of 50,000 hours.
- TCM® assembly may be used with Thermalloy's innovative PGA E-Z Mount™ or epoxy bonded to pin grid arrays. May also be special ordered with Chomerics Thermattach®** 405 or 412 thermally-conductive adhesive tapes.
- May be used in conjunction with PGA sockets, such as AMP 382624-1 and -2.

* See page A20 for information on the PGA E-Z Mount™ attachment method.

**"Thermattach" is a registered trademark of the Chomerics company.

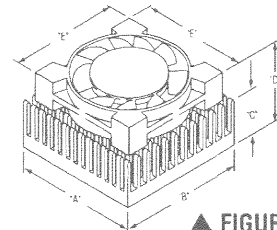
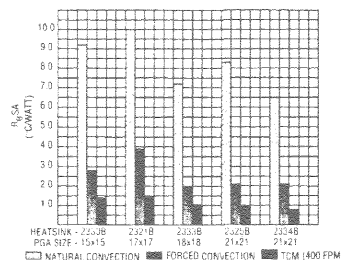
- Cools Intel i486, i860, i960, AMD AM29000, & Motorola 68040
- ** Cools Motorola 68040
- *** Cools Intel Pentium™ Processor 21 x 21 pin size (Pentium is a trademark of Intel Corporation)

AVAILABLE TCM's®							
Base Model	Figure	Nominal Dimensions: mm (inches)					PGA Size
		A	B	C	D	E	
		Fan Size: 40mm x 40mm x 10mm					
2330B-TCM	1	37.97 (1.495)	38.10 (1.500)	16.51 (0.650)	26.54 (1.045)	40.00 (1.575)	15 x 15
2321B-TCM *	1	41.28 (1.625)	43.18 (1.700)	8.89 (0.350)	18.92 (0.745)	40.00 (1.575)	17 x 17 and 18 x 18
2333B-TCM **	1	44.58 (1.755)	45.72 (1.800)	16.51 (0.650)	26.54 (1.045)	40.00 (1.575)	17 x 17 and 18 x 18
2325B-TCM ***	1	51.18 (2.015)	53.34 (2.100)	10.16 (0.400)	20.19 (0.795)	40.00 (1.575)	21 x 21
2334B-TCM ***	1	51.18 (2.015)	53.34 (2.100)	16.51 (0.650)	26.54 (1.045)	40.00 (1.575)	21 x 21
Fan Size: 60mm x 60mm x 10mm							
2388B-TCM	2	67.56 (2.660)	8.89 (.350)	19.30 (.760)			24 x 24
2389B-TCM	2	80.90 (3.185)	8.89 (.350)	19.30 (.760)			24 x 24
2390B-TCM	2	67.56 (2.660)	11.43 (.450)	21.84 (.860)			24 x 24
2391B-TCM	2	80.90 (3.185)	11.43 (.450)	21.84 (.860)			24 x 24
Patent Numbers on pin fin heat sinks: U.S. Patent Nos. 4,879,891 and 4,884,331, U.K. Patent No. 2204181 Additional Patents Pending.							

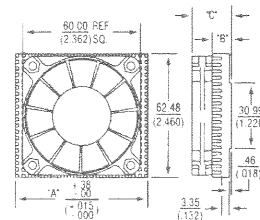
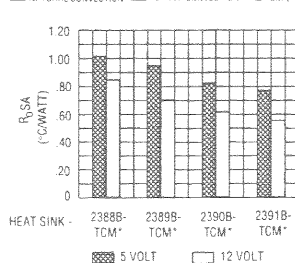
Patent Numbers on pin fin heat sinks: U.S. Patent Nos. 4,879,891 and 4,884,331,
U.K. Patent No. 2204181 Additional Patents Pending.

Note: The TCM® thermal performance shown is for the 12-volt 40mm fan. TCM® performance using the 5-volt 40mm fan is 5-10% lower as verified by test data. The fan cfm varies directly as a cube root of the input horsepower. (Test data is available from the factory.) For further information on basic TCM® performance, please request EIR #91-1002.

Note: Fan placement may be asymmetrical on heat sink.

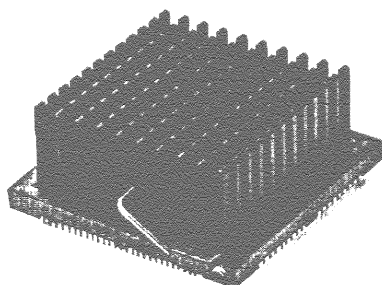
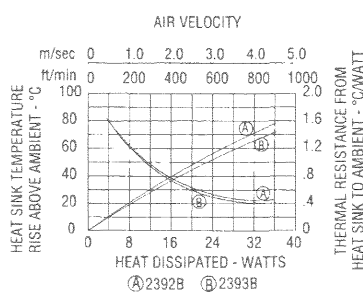
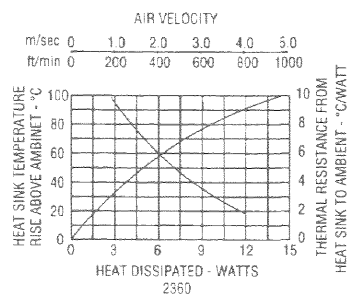
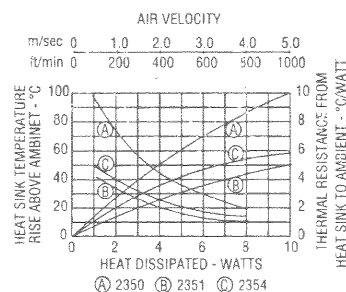
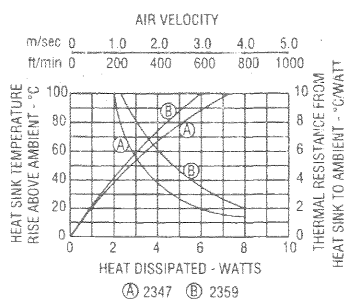
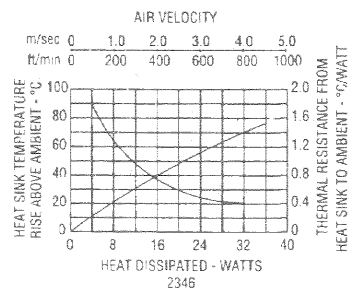
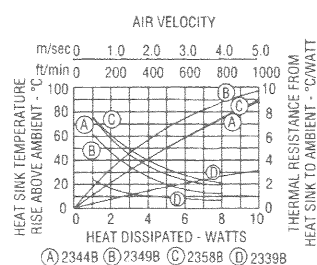
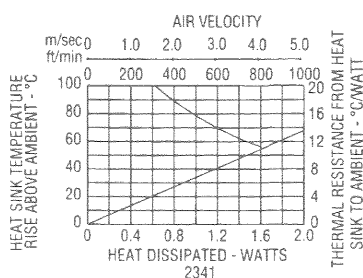
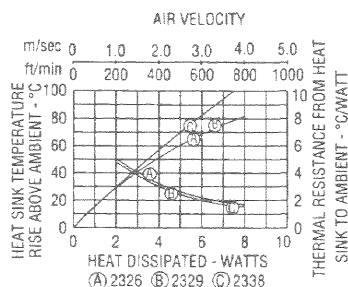
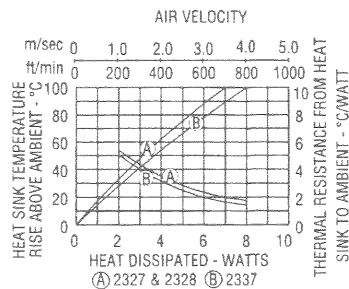
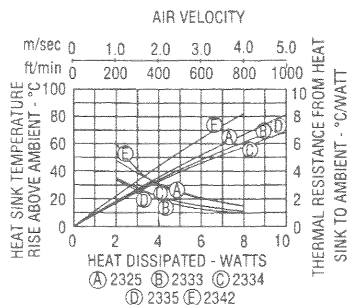
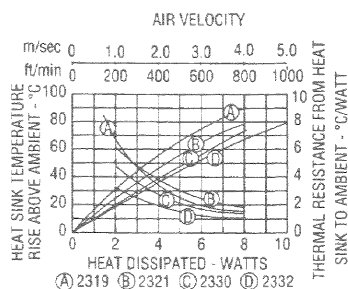


▲ FIGURE 1

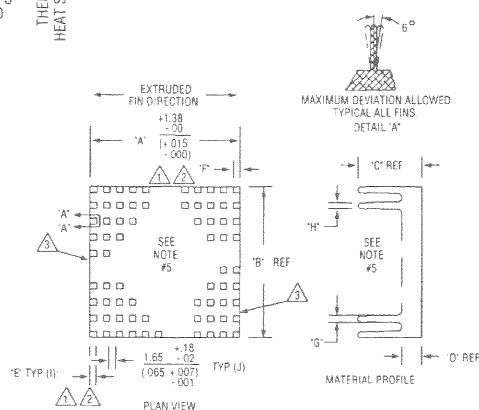


▲ FIGURE 2

2300 Series Pin Fin Heat Sinks



▲ 2330B HEAT SINK
WITH 8315-PF15 PGA E-Z MOUNT™



FAN DATA					
FAN SIZE: 40MM X 40MM X 10MM					
Fan Voltage	Rated Current (A)	Air Volume m ³ /min (cfm)	Static Pressure mm/H ₂ O (In. H ₂ O)	Noise dBA @ 1m	Weight grams (Lbs.)
12 volt	0.09	0.12 (4.24)	3.2 (0.126)	26	21 (0.046)
5 volt	0.19	0.12 (4.24)	3.0 (0.118)	23	18 (0.040)
FAN SIZE: 60MM X 60MM X 10MM					
12 volt	0.15	0.40 (14.1)	3.0 (0.118)	38	27 (0.060)
5 volt	0.18	0.30 (10.6)	1.7 (0.067)	28	27 (0.060)

ORDERING INFORMATION

To Order: Add the following suffixes to the base TCM® number in the order given below:

Suffix 1: "4" for fan size 40mm x 40mm x 10mm; "6" for fan size

60mm x 60mm x 10mm

Suffix 2: "2" for 12-volt fan, "5" for 5-volt fan

Suffix 3: "S" (indicates specific fan-all current TCM's® use "S")

Suffix 4: "FS" for frame and spring PGA E-Z Mount, "SS" for shoe and spring

Example: 2321B-TCM42S-FS

Note: For sample quantities, please contact your local agent or distributor. TCM's® ordered with the PGA E-Z Mount™ assembly are supplied with the spring permanently mounted between the heat sink and fan.

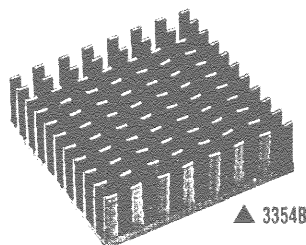
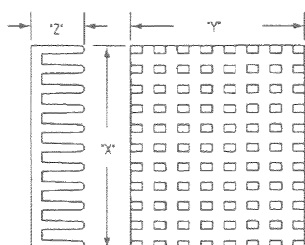
3300 Series Pin Fin Heat Sinks



3300 SERIES PIN FIN HEAT SINKS								
Model	Pin Fin Matrix	DIMENSIONS mm (inches)			R _θ °C/W Natural Convection	R _θ °C/W 1m/s (200 fpm)	R _θ °C/W 2m/s (400 fpm)	R _θ °C/W 5m/s (1000 fpm)
		X	Y	Z				
3320B	9 x 7	40.6 (1.598)	44.0 (1.732)	10.0 (.394)	9.9	5.6	3.9	2.1
3331B	9 x 7	40.6 (1.598)	44.0 (1.732)	16.5 (.650)	7.6	4.3	3.0	1.6
3321B*	10 x 7	45.5 (1.791)	44.0 (1.732)	10.0 (.394)	9.0	5.1	3.5	1.9
3332B*	10 x 7	45.5 (1.791)	44.0 (1.732)	16.5 (.650)	6.9	3.8	2.8	1.5
3325B*	11 x 8	50.4 (1.984)	50.7 (1.996)	10.0 (.394)	8.2	4.6	3.2	1.7
3334B*	11 x 8	50.4 (1.984)	50.7 (1.996)	16.5 (.650)	6.3	3.5	2.4	1.3
3354B*	11 x 8	50.4 (1.984)	50.7 (1.996)	25.0 (.984)	4.8	2.3	1.8	0.9
3358B	14 x 11	65.1 (2.563)	70.8 (2.787)	25.0 (.984)	3.1	1.7	1.2	0.7

*For ZIF Socket heat sink with clip, see Spring Wing Clips on page A21.

Note: Can be used with Conducta-Cote™, adhesive, Thermattach® or clips.



▲ 3354B

2300 Series Pin Fin Heat Sinks

Model	PGA Size	R _g Natural Convection °C/W	R _g Forced Convection (400 FPM) °C/W	Pin Fin Matrix	PGA E-Z Mount*		Dimensions: mm (inches)								Typical	
					Frame	Spring	A	B	C	D	E	F	G	H	I	J
2341B	N/A	34.1	18.0	4 x 6			17.40 (.685)	10.16 (.400)	10.16 (.400)	1.32 (.052)	1.52 (.060)	1.52 (.060)	1.62 (.064)	1.32 (.052)	5	5
2327B	11 x 11	15.0	3.5	7 x 9			28.07 (1.105)	27.94 (1.100)	15.24 (.600)	3.81 (.150)	1.65 (.065)	1.65 (.065)	1.57 (.062)	1.57 (.062)	8	8
2328B	11 x 11	15.0	3.5	7 x 8	8311	PF11	24.76 (.975)	27.94 (1.100)	15.24 (.600)	3.81 (.150)	1.65 (.065)	1.65 (.065)	1.57 (.062)	1.57 (.062)	7	7
2337B	12 x 12	12.9	3.1	8 x 9		PF11	28.07 (1.105)	30.48 (1.200)	16.51 (.650)	5.08 (.200)	1.65 (.065)	1.65 (.065)	1.50 (.059)	1.50 (.059)	8	8
2326B	13 x 13	10.0	3.0	8 x 10	8313	PF13	31.37 (1.235)	33.02 (1.300)	16.51 (.650)	5.08 (.200)	1.65 (.065)	1.65 (.065)	1.55 (.061)	1.55 (.061)	9	9
2338B	13 x 13	13.0	3.0	9 x 10	8313	PF13	31.37 (1.235)	33.02 (1.300)	12.45 (.490)	3.30 (.130)	1.65 (.065)	1.65 (.065)	2.08 (.082)	1.52 (.060)	9	9
2329B	14 x 14	10.0	3.0	9 x 10	8314	PF14	31.37 (1.235)	34.49 (1.358)	16.51 (.650)	5.08 (.200)	1.65 (.065)	1.65 (.065)	1.93 (.076)	1.57 (.062)	9	9
2319B	15 x 15	12.5	3.5	10 x 12	8315	PF15	37.97 (1.495)	38.10 (1.500)	10.16 (.400)	3.05 (.120)	1.65 (.065)	1.65 (.065)	1.52 (.060)	1.52 (.060)	11	11
2330B	15 x 15	9.2	2.8	10 x 12	8315	PF15	37.97 (1.495)	38.10 (1.500)	16.51 (.650)	5.08 (.200)	1.65 (.065)	1.65 (.065)	1.93 (.076)	1.52 (.060)	11	11
2358B	17 x 17	9.4	3.6	12 x 17			54.48 (2.145)	43.18 (1.700)	8.89 (.350)	3.05 (.120)	1.65 (.065)	1.65 (.065)	2.11 (.083)	1.55 (.061)	16	16
2321B	17 x 17	10.0	3.9	12 x 13	8317	PF17	41.28 (1.625)	43.18 (1.700)	8.89 (.350)	3.05 (.120)	1.65 (.065)	1.65 (.065)	1.55 (.061)	1.55 (.061)	12	12
2332B	17 x 17	8.2	2.0	12 x 13	8317	PF17	41.28 (1.625)	43.18 (1.700)	16.51 (.650)	5.08 (.200)	1.65 (.065)	1.65 (.065)	1.83 (.072)	1.27 (.050)	12	12
2333B	17 x 17	7.2	2.0	12 x 14	8317	PF17	44.58 (1.755)	45.72 (1.800)	16.51 (.650)	5.08 (.200)	1.65 (.065)	1.65 (.065)	1.85 (.073)	1.30 (.051)	13	13
2342B	17 x 17	10.3	3.0	14 x 14	8317	PF17	44.58 (1.755)	45.72 (1.800)	6.98 (.275)	3.05 (.120)	1.65 (.065)	1.65 (.065)	1.78 (.070)	1.47 (.058)	13	13
2335B	19 x 19	7.2	2.0	12 x 15		PF19	47.88 (1.885)	48.26 (1.900)	16.51 (.650)	5.08 (.200)	1.65 (.065)	1.65 (.065)	2.16 (.085)	1.60 (.063)	14	14
2349B	19 x 19	12.5	3.3	12 x 18			56.87 (2.239)	48.26 (1.900)	16.51 (.650)	5.08 (.200)	1.60 (.063)	1.60 (.063)	2.16 (.085)	1.60 (.063)	17	17
2359B	19 x 19	8.8	6.1	12 x 18			56.87 (2.239)	48.26 (1.900)	10.16 (.400)	3.05 (.120)	1.60 (.063)	1.60 (.063)	2.16 (.085)	1.60 (.063)	17	17
2325B	21 x 21	8.3	2.1	16 x 16	8321	PF21	51.18 (2.015)	53.34 (2.100)	10.16 (.400)	3.05 (.120)	1.65 (.065)	1.65 (.065)	1.52 (.060)	1.52 (.060)	15	15
2334B	21 x 21	6.5	2.1	14 x 16	8321	PF21	51.18 (2.015)	53.34 (2.100)	16.51 (.650)	5.08 (.200)	1.65 (.065)	1.65 (.065)	1.62 (.064)	1.27 (.050)	15	15
2339B	21 x 21	3.1	1.0	6 x 9	8321	PF21	53.31 (2.099)	53.31 (2.099)	44.45 (1.75)	4.78 (.188)	3.10 (.122)	3.12 (.123)	3.81 (.150)	1.63 (.064)	8	8
2344B	21 x 21	9.3	4.1	14 x 16	8321	PF21	51.18 (2.015)	53.34 (2.100)	10.20 (.400)	3.05 (.120)	1.65 (.065)	1.65 (.065)	1.57 (.062)	1.27 (.050)	15	15
2350B	21 x 21	5.8	2.3	14 x 21			67.13 (2.643)	53.34 (2.100)	16.51 (.650)	5.08 (.200)	1.62 (.064)	1.60 (.063)	1.57 (.067)	1.27 (.050)	20	20
2351B	21 x 21	2.2	1.0	6 x 11			65.84 (2.592)	53.31 (2.099)	44.45 (1.750)	4.78 (.188)	3.10 (.122)	3.10 (.122)	3.81 (.150)	1.62 (.064)	10	10
2354B	21 x 21	2.8	1.4	6 x 9	8321	PF21	52.96 (2.085)	48.90 (1.925)	44.45 (1.750)	5.08 (.200)	3.05 (.120)	3.18 (.125)	2.29 (.090)	1.65 (.065)	8	8
2360B	21 x 21	8.6	6.1	16 x 21			67.13 (2.643)	53.34 (2.100)	10.16 (.400)	3.05 (.120)	1.62 (.064)	1.60 (.063)	1.52 (.060)	1.52 (.060)	19	19
2346B	24 x 24	2.1	0.7	8 x 11			67.56 (2.660)	67.56 (2.660)	38.10 (1.500)	5.08 (.200)	3.25 (.128)	1.65 (.065)	3.18 (.125)	1.59 (.063)	10	10
2347B	24 x 24	8.1	3.6	21 x 21			67.56 (2.660)	67.56 (2.660)	8.89 (.350)	3.81 (.150)	1.65 (.065)	1.52 (.060)	1.78 (.070)	1.52 (.060)	20	20
2392B	24 x 24	2.1	.08	8 x 11			67.56 (2.660)	62.48 (2.460)	38.10 (1.500)	4.63 (.182)	3.25 (.128)	3.30 (.130)	3.18 (.125)	1.40 (.055)	10	10
2393B	24 x 24	2.0	.64	8 x 13			80.36 (3.164)	62.48 (2.460)	38.10 (1.500)	4.62 (.182)	3.25 (.128)	3.25 (.128)	3.18 (.125)	1.40 (.055)	12	12

U.S. Patent Nos. 4,879,891, and 4,884,331 U.K. Patent No. 2204181 Additional Patents pending. Tolerances are $\pm .28\text{mm}$ (.011") unless otherwise specified.

Notes: ▲ To achieve fin uniformity, variation from minimum fin dimension to maximum fin dimension must be 41mm (.016") or less. ▲ Tolerances do not apply to last row of fins, due to manufacturing variances. This row, however, meets requirements as specified in note ▲ above. ▲ Cut off either end to be $\pm 1/2^\circ$ angularity in relation to extruded length. ▲ Dimensions and tolerances are to be considered at the extruded base unless otherwise specified. ▲ Fin layout as shown is intended to be representative only. The actual fin count and layout is specified in the table. ▲ The 8301, 8302, or 8304 "shoes" may be used in place of the frame if desired. ▲ The PF13 and PF19 springs are available on special order. Contact the factory. ▲ The PGA E-Z Mount is compatible with heat sinks listed under smaller PGA sizes. ▲ For LIF Socket clip, see SCA Spring Clips on page A21. ▲ For ZIF socket heat sink with clip, see Spring Wing Clips on page A21.

* See page A20 for information on the PGA E-Z Mount.