Intel® Xeon® Processor D-1500 Product Family Thermal/Mechanical Specification and Design Guide

Intel Corporation
November 2015
Reference Number: 332055-002

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Revision History

Revision	Comments	Date
002	• Added 6-core Microserver SKU. • Added Networking, IOTG, and Storage SKUs. • Added reference heatsink information for Networking, IOTG, and Storage segments	November 2015

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Contents

- Introduction
- References
- Definition of Terms
- Package Information
  - Package mechanical drawing
  - Solder ball land pattern requirements
- Thermal Information
  - Thermal, Power and SKU Summary
  - Thermal Features
- Reference Designs and Suppliers for each segment
  - Microserver reference thermal solutions
  - Storage reference thermal solutions
  - Communications Infrastructure reference thermal solutions
- Appendix A – Intel® Xeon® Processor D-1500 Product Family Package Mechanical Drawing
- Appendix B – Standard Heatsink Mechanical Drawings
- Appendix C – Low Profile Heatsink Mechanical Drawings
- Appendix D – SBB Standard Storage Heatsink Mechanical Drawings
- Appendix E – ATCA* Reference Heatsink Mechanical Drawings
- Appendix F – CPCI* Reference Heatsink Mechanical Drawings
- Appendix G – Heatsink Suppliers

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Introduction

This document provides specifications and guidelines for the design of thermal and mechanical solutions for Intel® Xeon® Processor D-1500 Product Family for Microserver, Storage, and Communications segments.

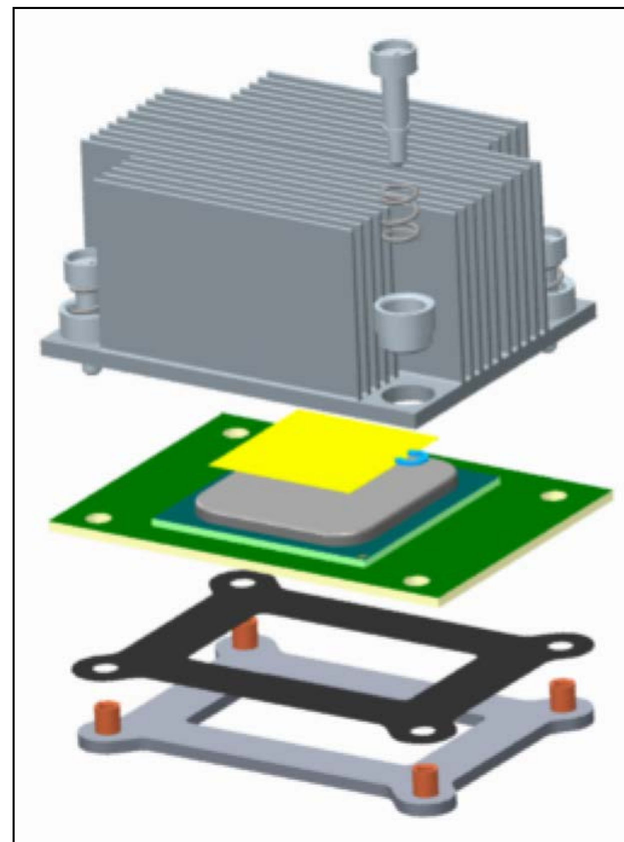
The specifications and design guidelines apply to Intel® Xeon® Processor D-1500 Product Family in their current stage of development and *are subject to change*.

The reference thermal solutions described in this document include:

- Heatsink
- Retention hardware

The goal of this document is to enable board and system thermal mechanical designers and suppliers of SoC heatsinks to design thermal solutions for Intel® Xeon® Processor D-1500 Product Family.

The Intel® Xeon® Processor D-1500 Product Family SKU summary is located here.



Nominal reference heatsink for Microserver

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References

Document	Reference	Notes
Intel® Xeon® Processor D-1500 Product Family Datasheet - Volume 1 of 4: Integrated Platform Controller Hub	332050	1
Intel® Xeon® Processor D-1500 Product Family Datasheet - Volume 2 of 4: Registers	332051	1
Intel® Xeon® Processor D-1500 Product Family Datasheet - Volume 3 of 4: Electrical	332052	1
Intel® Xeon® Processor D-1500 Product Family Datasheet - Volume 4 of 4: Intel® Xeon® Processor D-1500 Product Family LAN Controller	332053	1
Storage Bridge Bay Specification	http://sbbwg.org	
Running Average Power Limit (RAPL) White Paper	495964	www.intel.com
System Mechanical Design Guidance for Dynamic Events - Application Notes /Briefs	383578	
Board Flexure Initiative (BFI) - Manufacturing Advantage Service (MAS)	http://www.intel.com/design/quality/cme.htm	
Server Systems Infrastructure (SSI) - Microserver Micromodule Specification	http://ssiforum.org	
PICMG Specifications (AdvancedTCA, AdvancedMC, etc.)	http://www.picmg.org	
Form Factor Specifications (Motherboard, Power Supply, Riser, etc.)	http://www.formfactors.org	
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Definition of Terms

Term	Description
ATCA	Advanced Telecommunications Computing Architecture
Bypass	Bypass is the area between a passive heatsink and any object that can act to form a duct. For this example, it can be expressed as a dimension away from the outside dimension of the fins to the nearest surface.
CPCI	Compact Peripheral Component Interconnect
DTS	Digital Thermal Sensor
FSC	Fan Speed Control
IHS	Integrated Heat Spreader
IOTG	Internet of Things Group
PECI	The Platform Environment Control Interface (PECI) is a one-wire interface that provides a communication channel between SoC and chipset components to external monitoring devices
Ψ_{ca}	Case-to-ambient thermal characterization parameter (psi). A measure of thermal solution performance using Total Package Power. Defined as (T_{CASE} – TLA) / (TDP). Heat source should always be specified for Y measurements.
Ψ_{cs}	Case-to-sink thermal characterization parameter. A measure of thermal interface material performance using Total Package Power. Defined as (T_{CASE} – T_{SINK}) / (TDP).
SoC	System On a Chip.
T_{CASE}	The case temperature of the SoC measured at the geometric center of the topside of the IHS.
$T_{CASE-MAX}$	The maximum case temperature as specified in a component specification.

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Definition of Terms Continued

Term	Description
TCC	Thermal Control Circuit: thermal monitor uses the TCC to reduce the die temperature by using clock modulation and /or operating frequency and input voltage adjustment when the die temperature is very near its operating limits.
TDP	Thermal Design Power: thermal solution should be designed to dissipate this target SOC power level. TDP is not the maximum power that the SoC can dissipate.
Thermal Monitor	A power reduction feature designed to decrease temperature after the SoC has reached its maximum operating temperature.
TIM	Thermal Interface Material: The thermally conductive compound between the heatsink and the SoC integrated heat spreader (IHS). This material fills the air gaps and voids, and enhances the transfer of the heat from the SoC case to the heatsink.
T_{LA}	The measured ambient temperature locally surrounding the SoC. The ambient temperature should be measured just upstream of a passive heatsink or at the fan inlet for an active heatsink.
T_{SA}	The system ambient air temperature external to a system chassis. This temperature is usually measured at the chassis air inlets.
TTV	Thermal Test Vehicle
KOZ	Keep Out Zone
SJR	Solder Joint Reliability
SRO	Solder Resist Opening

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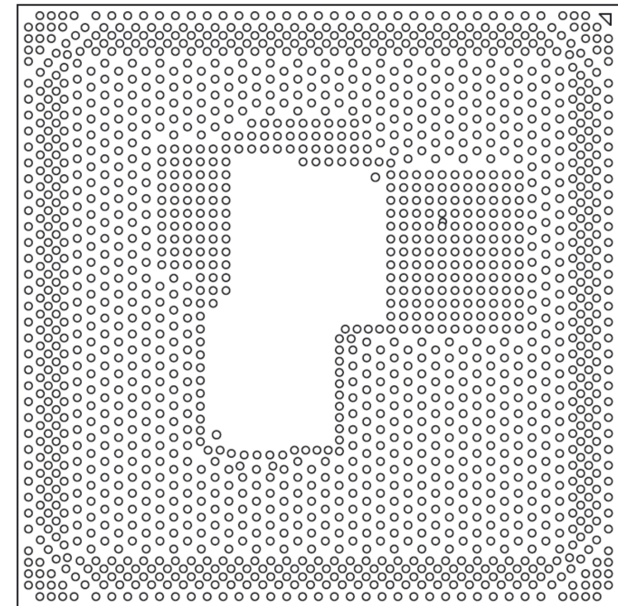
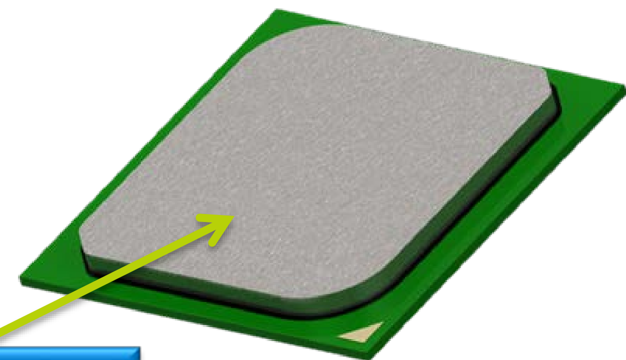
Intel® Xeon® Processor D-1500 Product Family Package

Attribute	Intel® Xeon® Processor D-1500 Product Family
Package	1667 Ball FCBGA
Solder Ball Diameter[1]	0.462 mm
Solder Ball Pitch	0.7 mm, Variable
Substrate Size[1]	37.5 mm x 37.5 mm
Substrate Thickness[1]	1.222 mm
Integrated Heat Spreader Height[1]	2.08 mm
Package Height[1,2]	3.556 mm
Min/ Max Static Loading – with backplate	0 Lbf min, 35 Lbf max
Min/ Max Static Loading – without backplate	0 Lbf min, 15 Lbf max
Non-Critical to Function solder balls	114

Notes:
1. All dimensions are nominal
2. Package height is from the top of Integrated Heat Spreader (IHS) to bottom of the solder balls, Pre-SMT



BALL PATTERN



Integrated Heat Spreader (IHS)

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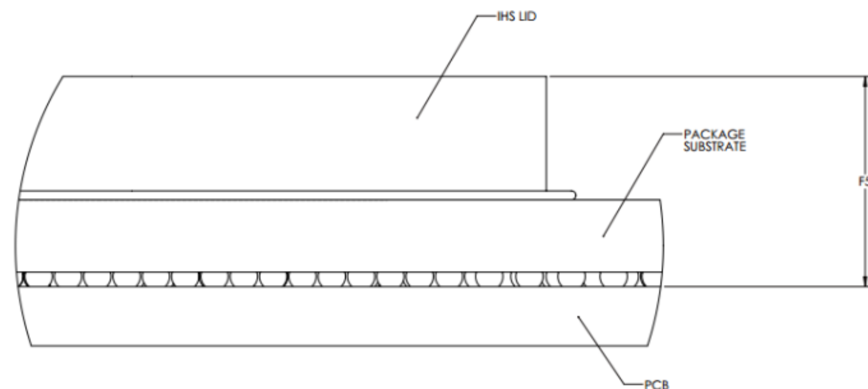
Intel® Xeon® Processor D-1500 Product Family Mechanical Drawing

B1
C1
D1
PKG ℄
IHS ℄
2X1.75
A
A
C2
B2
2X2
PIN 1
F2
F4
F3
N
P
C

Symbol	Nominal (mm)	Tolerance (mm)
B1	37.5	± 0.05
B2	37.5	± 0.05
C1	30.7	± 0.05
C2	33	± 0.05
D1	0.154	N/A
F2	2.08	± 0.078
F5	3.556	± 0.076



See Appendix A for Detailed Mechanical Drawing

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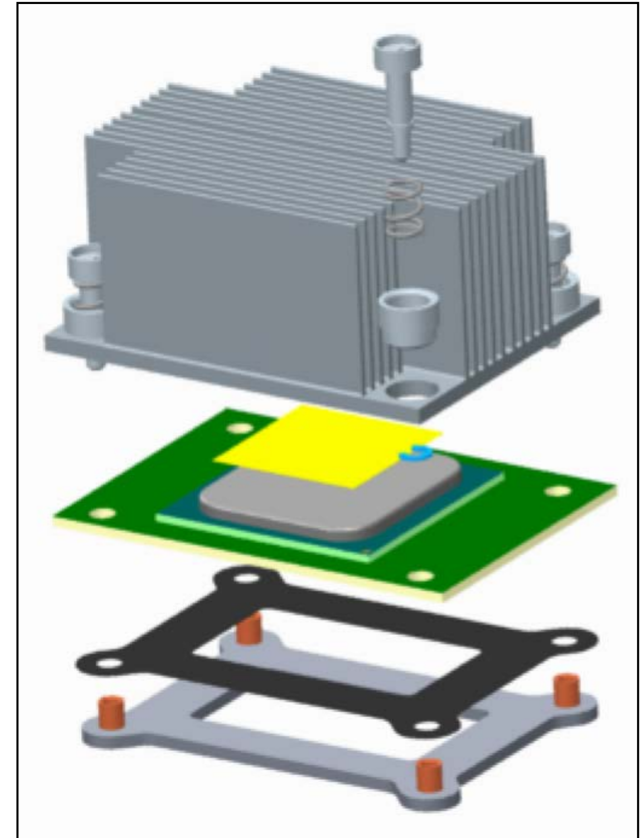
SoC Thermal Specifications

The SoC requires a thermal solution to maintain temperatures within operating limits. Any attempt to operate the SoC outside these limits may result in permanent damage to the SoC and potentially other components within the system. Maintaining the proper thermal environment is key to reliable, long-term system operation.

A complete solution includes both component and system level thermal management features. Component level thermal solutions can include active or passive heatsinks in contact with the SoC integrated heat spreader (IHS). Typical system level thermal solutions may consist of system fans combined with ducting and venting.

To allow optimal operation and long-term reliability of Intel SoC-based systems, the SoC must remain within the case temperature (T_{CASE}) specifications as defined in here.



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Intel® Xeon® Processor D-1500 Product Family Thermal, Power and SKU Summary – Microserver

Core Count	TDP (W)	Non-Uniform Power Correction Factor[1] (C/W)	T_{CASE_MAX} (°C)	T_{CASE_MIN} (°C)	DTSmax (°C)	Tcontrol (°C)	Notes
8	45	0.05	80	0	96	10	1,2,3,4,5,6
6	45	0.05	80	0	99	10	1,2,3,4,5,6
4	45	0.04	80	0	102	10	1,2,3,4,5,6

Notes
1. CF is the non-uniform heating correction factor in °C/W is defined as: CF= Ψ_{CA_SoC} - $\Psi_{CA_uniform_heating_TTV_model}$. It should be used to adjust Ψ_{CA} calculations or measurements based on the TTV thermal model/hardware that Intel provides to account for power density effect of operational silicon.
2. T_{CASE} is measured at the geometric center at the top surface of the Integrated Heat Spreader
3. Thermal Design Power (TDP) should be used as a target for SoC thermal solution design at maximum T_{CASE}. SoC power may exceed TDP for short durations. Please see Intel® Turbo Boost Technology for details.
4. These specifications are based on initial pre-silicon simulations, which will be updated as further characterization data becomes available.
5. Power specifications are defined at all VIDs found in the Intel® Xeon® Processor D-1500 Product Family SoC Datasheet. SoCs may have multiple VIDs for each frequency.
6. Based on 3 nodes in-line of the airflow and using the Standard reference heatsink.

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Intel® Xeon® Processor D-1500 Product Family Thermal, Power and SKU Summary – Networking, IOTG, and Storage

Core Count	TDP (W)	Non-Uniform Power Correction Factor[1] (C/W)	T_{CASE_MAX} (°C)	T_{CASE_MIN} (°C)		DTSmax (°C)	Tcontrol (°C)	Notes
8	45	0.05	89	0		104	22	1,2,3,4,5
8	35	0.05	92	-40	0	104	22	1,2,3,4,5,6,7
6	35	0.06	88	0		104	22	1,2,3,4,5
4	35	0.06	85	0		104	22	1,2,3,4,5
4	25	0.05	93	-40	0	104	22	1,2,3,4,5,6,7
2	25	0.04	92	0		104	22	1,2,3,4,5
2	20	0.04	96	0		106	22	1,2,3,4,5

Notes

1. CF is the non-uniform heating correction factor in °C/W is defined as: CF= Y_{CA_SoC} - $Y_{CA_uniform_heating_TTV_model}$. It should be used to adjust Y_{CA} calculations or measurements based on the TTV thermal model/hardware that Intel provides to account for power density effect of operational silicon.
2. T_{CASE} is measured at the geometric center at the top surface of the Integrated Heat Spreader
3. Thermal Design Power (TDP) should be used as a target for SoC thermal solution design at maximum T_{CASE}. SoC power may exceed TDP for short durations. Please see Intel® Turbo Boost Technology for details.
4. These specifications are based on initial pre-silicon simulations, which will be updated as further characterization data becomes available.
5. Power specifications are defined at all VIDs found in the Intel® Xeon® Processor D-1500 Product Family SoC Datasheet. SoCs may have multiple VIDs for each frequency.
6. SKU configuration available as an eTEMP (Extended Temperature) or a Standard Temperature Part.
7. SKUs are only validated up to 90°C of dynamic range, Intel does not guarantee that the sku will operate properly outside this range. Dynamic range = absolute (Operating temp – Boot Temperature).

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What is eTemp?

Definition

- Extended temperature or eTEMP is a stringent operating temperature range that ensures that a electrical or mechanical component will operate reliably in a -40°C to 85°C environment.

What does the Operating Temperature Mean?

- Cold: The lowest local system boot temperature of the device (Cold Soak).
  - $T_{AIR} = T_{LA} = T_{Case\text{-}MIN}$
- Hot: The hottest local temperature ~1” (25mm)† upstream of the component.
  - $T_{AIR} < T_{LA} < T_{Case\text{-}MAX}$

Does this mean that $T_{Case\text{-}MAX}$ will change for eTEMP?

- No. $T_{Case\text{-}MAX}$ is a component level specification and should not be confused with eTEMP operating temperature ranges.

What about $T_{Case\text{-}MIN}$?

- $T_{Case\text{-}MIN}$ will change to meet -40°C. $T_{Case\text{-}MIN}$ will be equal to the operating ambient temperature during cold soak durations. T_{Case} does not need to be maintained at -40°C after boot.

(†This distance may need to be reduced depending on system density and upstream components.)

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Tcontrol Overview

Customers are required to maintain the SoC temperature, as measured by the DTS, at or below the Tcontrol temperature to ensure long term reliability of the SoC. The Tcontrol specification is an offset from DTSmax, resulting in the following equation for calculating the Tcontrol temperature:

Tcontrol temperature = DTSmax – Tcontrol

The SoC temperature can be calculated by the following equation:

DTS temperature = DTSmax – DTS offset

The following actions summarize required responses to the Tcontrol temperature:

- DTS Temperature < Tcontrol temperature → The system can run under any desired fan speed control condition.
- DTS Temperature = Tcontrol temperature → Tcontrol limit attained, system must increase fan speed to reduce DTS temperature below Tcontrol temperature.
- DTS Temperature > Tcontrol temperature → Fan speed increase is required to maintain Tcase below Tcase-max.

Note: SoC temperature (either Tcase or DTS) may exceed Tcontrol for a duration totalling less than 360 hours per year without affecting long term reliability (life) of the SoC.

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Thermal Management Features

The following is a list of supported features on the SoC:

- **Digital Thermal Sensor** – On-die sensor for SoC temperature monitoring.
- **Intel® Adaptive Thermal Monitor-** The Adaptive Thermal Monitor feature provides an enhanced method for controlling the SoC temperature when the SoC silicon exceeds the Thermal Control Circuit (TCC) activation temperature
- **THERMTRIP**- in the event of cathastrophic cooling failure the SoC will automatically shut down when the silicon has reached and elevated temperature. THERMTRIP_N, a non-user configurable and non-software visible signal, will go active and stay active
- **PROCHOT_N support** - The PROCHOT_N signal is bi-directional in that it can either signal when the SoC (any core) has reached its maximum operating temperature or be driven from an external source to activate the TCC.
- **On-Demand Mode** – The SoC provides an auxiliary mechanism that allows system software to force the SoC to reduce its power consumption.
- **Memory Thermal Throttling** – The purpose is to protect DIMMs from excess temperature which can cause harm over time, as well as ensure that the proper refresh rate is achieved. Closed Loop Thermal Throttling, Open Loop Thermal Throttling and DDR01_MEMHOT_N Signal are features available
- **Running Average Power Limit (RAPL)** - This feature allows setting a power budget on the SoC domain (a.k.a. core or package RAPL) that limits total SoC power through frequency reduction. It also allows monitoring of performance (frequency) and average SoC power for a user configurable time window ("running average" approach). This feature provides a variety of potential benefits, including meeting power budgets and maintaining thermal/power limits at the system, rack and/or data center levels.
- **Platform Environment Control Interface (PECI)** - An Intel-defined, one-wire bus interface that provides a communication channel between Intel processors and external system management devices. The interface enables an external management controller to obtain thermal data from sensors integrated into components in the system. For details on PECI implementation and commands, refer to the Platform Environment Control Interface (PECI) Specification.

Please consult the Datasheet for details.

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Tcase Metrology

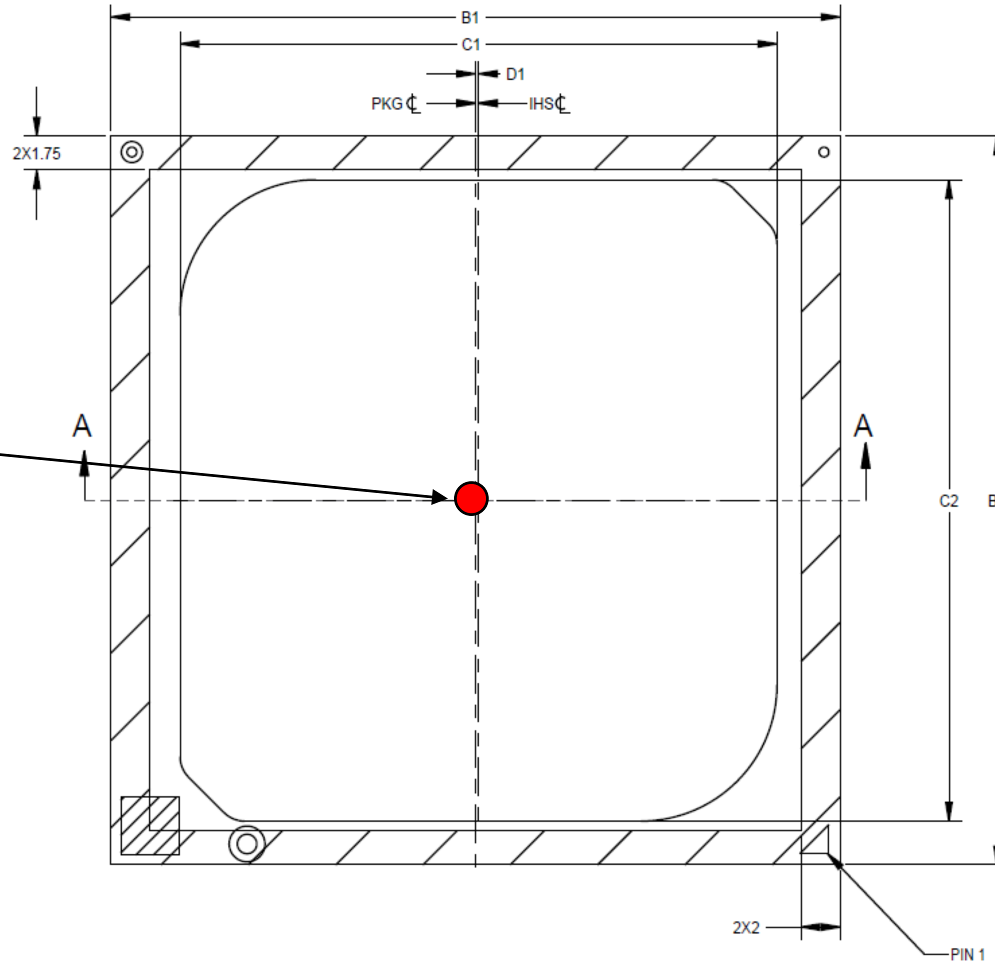
The following supplier can machine the groove and attach a thermocouple to the IHS. The supplier is listed below as a convenience to Intel's general customers and the list may be subject to change without notice.

THERM-X OF CALIFORNIA Inc, 3200 Investment Blvd., Hayward, Ca 94545.

George Landis +1-510-441-7566 Ext. 368 georgel@therm-x.com

The vendor part number is XTMS1565.

Tcase located at the geometric center of the IHS



Consult Intel® Xeon® Processor D-1500 Product Family SoC Thermal Test Vehicle User's Guide listed in the references for further instrumentation details

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REFERENCE DESIGNS AND SUPPLIERS FOR EACH SEGMENT

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MICROSERVER REFERENCE DESIGN

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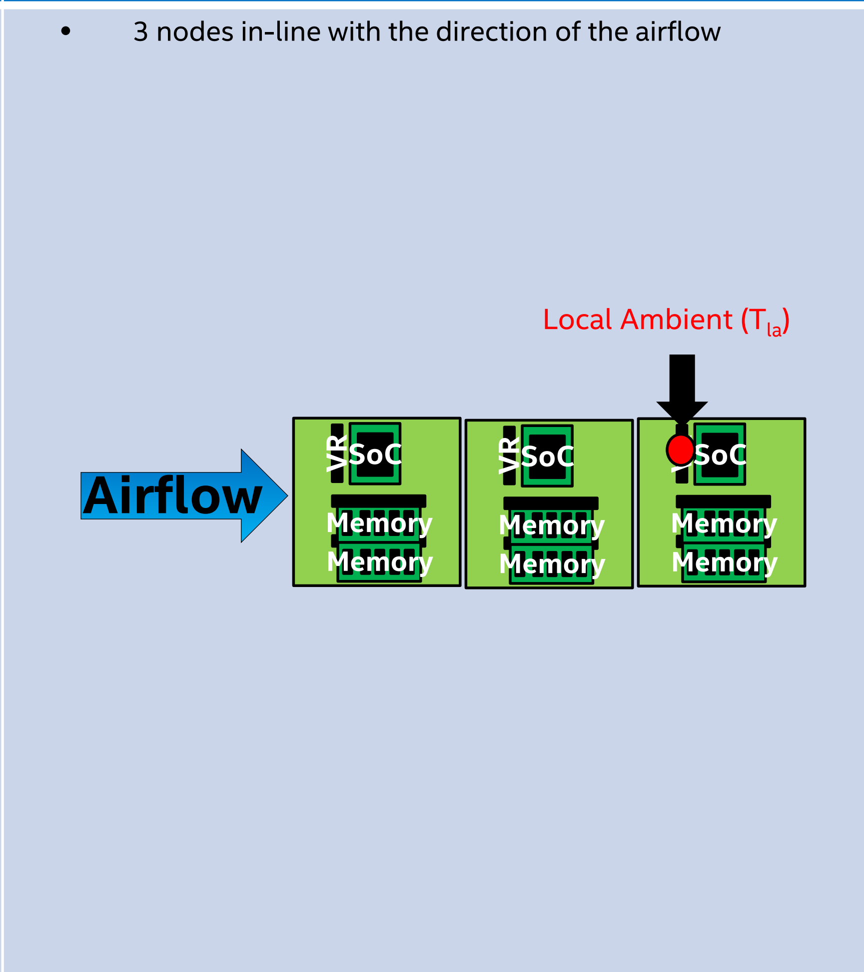
Reference Thermal Solution Assumptions - Standard Heatsink

Power SKU	Number of nodes in-line with the direction of the airflow	Key Assumptions
45W	• 3 nodes in-line with the direction of the airflow  	The enabling boundary conditions are based on the following assumptions : • ASHRAE class A2 environment. • Micro-module channel airflow: 30CFM. • Local ambient temperature at the last node assumes 85% TDP for upstream nodes. • Pitch between micromodules: 42mm. • Airflow management to maximize heatsink flow. Notes: 1. Customer node density may vary. 2. Node density changes may drive SoC temperature specification changes. 3. Module width may vary depending on customer implementation, in this case a width between ~254 mm and ~305 mm and a height of ~119 mm was considered. Micromodule channel Air baffles Standard Reference heatsink SODIMMs Pitch

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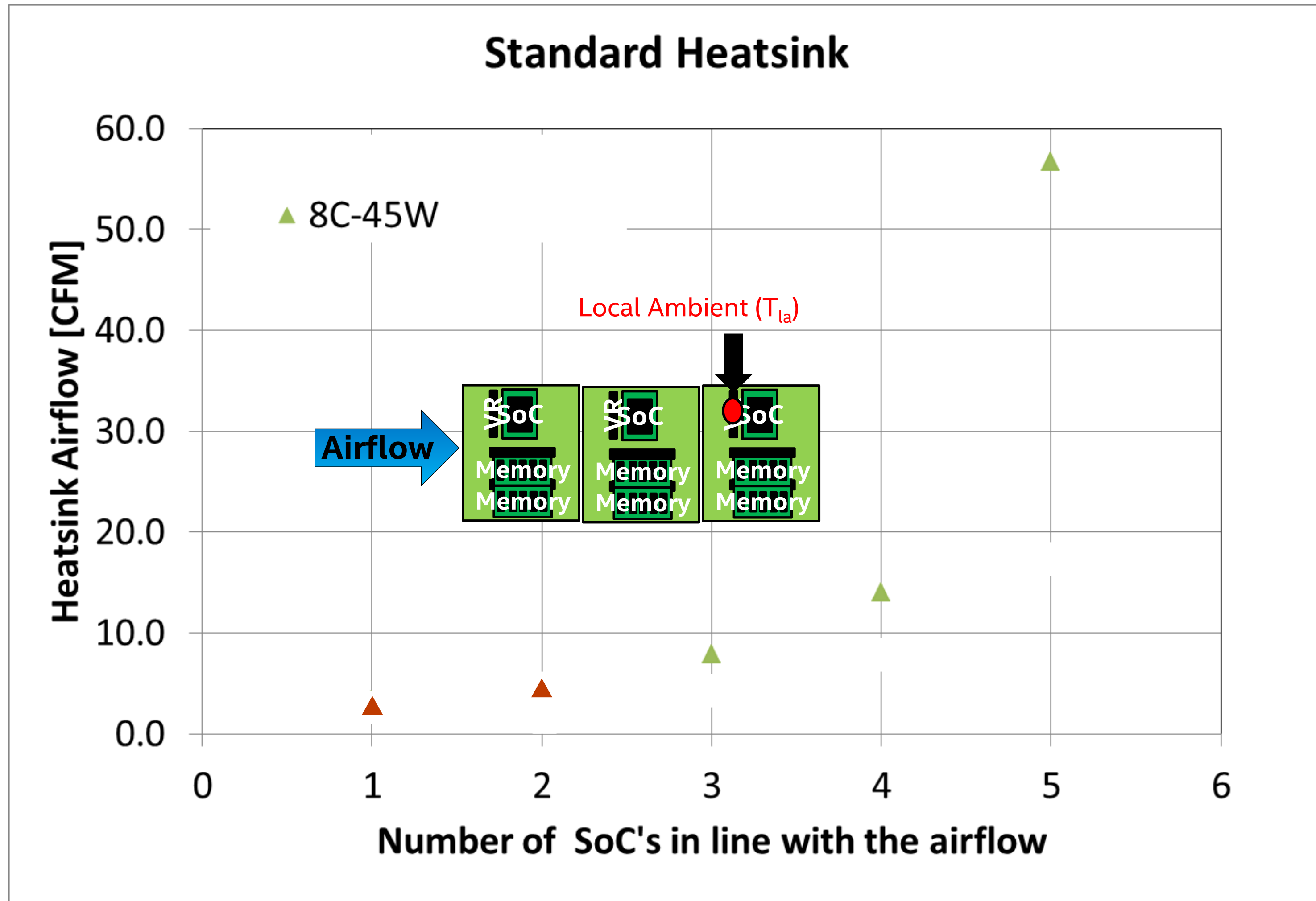
Heatsink Airflow Guidance* as a function of Nodes In-line
(cont'd)



* Using conditions above. Customer implementations may vary

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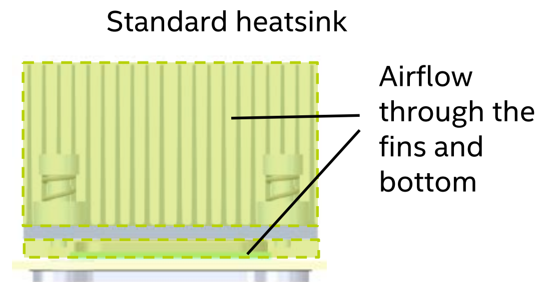
System Reference Boundary Conditions

SoC Power Range SKU	Reference Heatsink Concept	Local ambient Temperature, T_{la} (˚C)	Airflow through Heatsink (CFM)	Notes
45W	Standard	48.7	7.9	1

Notes:
1. 3 nodes in-line with the direction of the airflow

Standard heatsink



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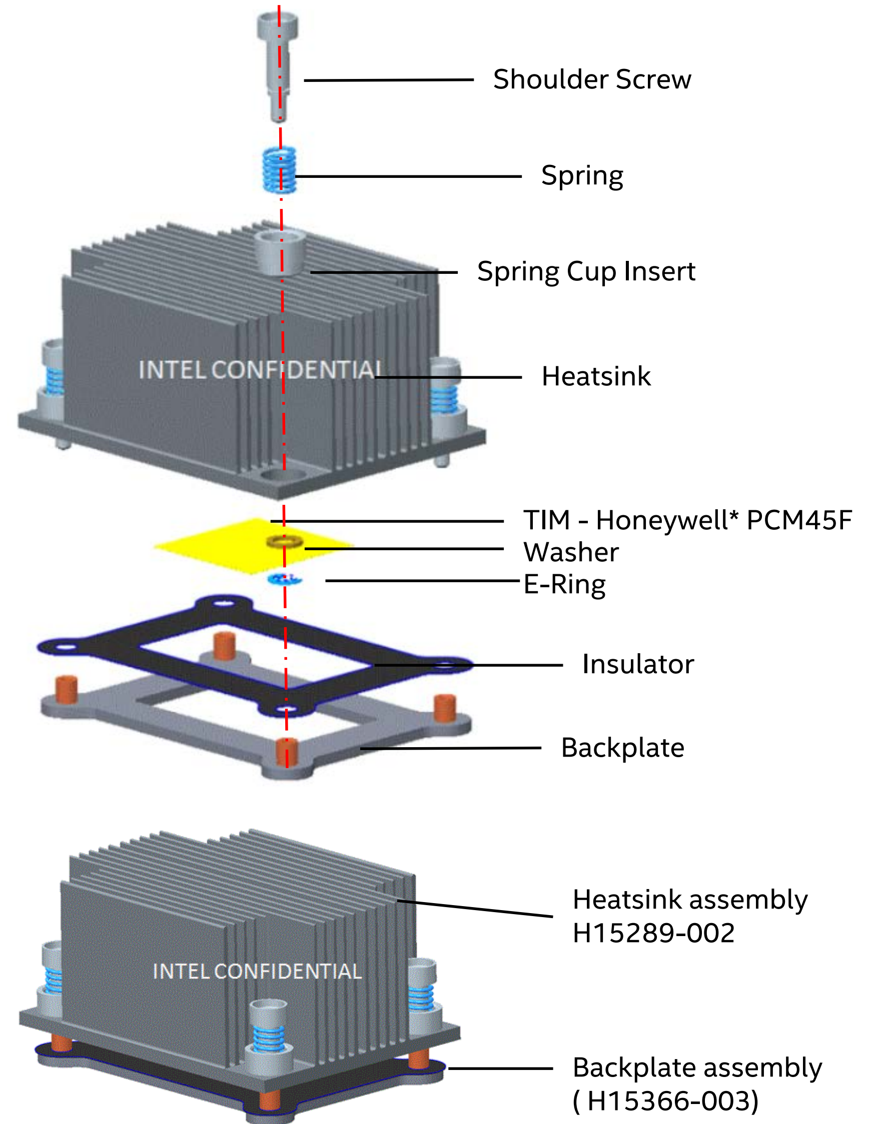
Standard Height Heatsink Design - Microserver

Standard heatsink design details

- Material: Extruded aluminum heatsink
- Overall heatsink dimensions: 50mm(W) x 66mm(L) x 29.85 mm(H)
- Retention: four screws with backplate
- TIM: PCM45F
  - Min required load is **27 lbf** EOLife
- Fins: qty 20 (27.35mm tall)
- Pitch: 2.5mm
- Base thickness: 2.5mm
- Backplate is mainly used to provide higher TIM force
- Target power is >20W

See Appendix B for mechanical drawings and Appendix H for supplier info



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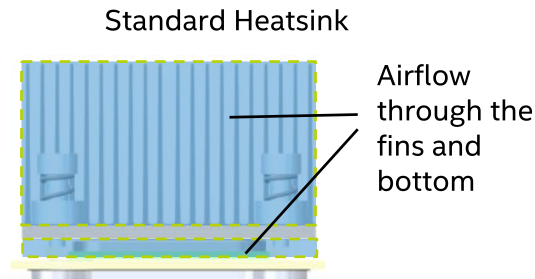
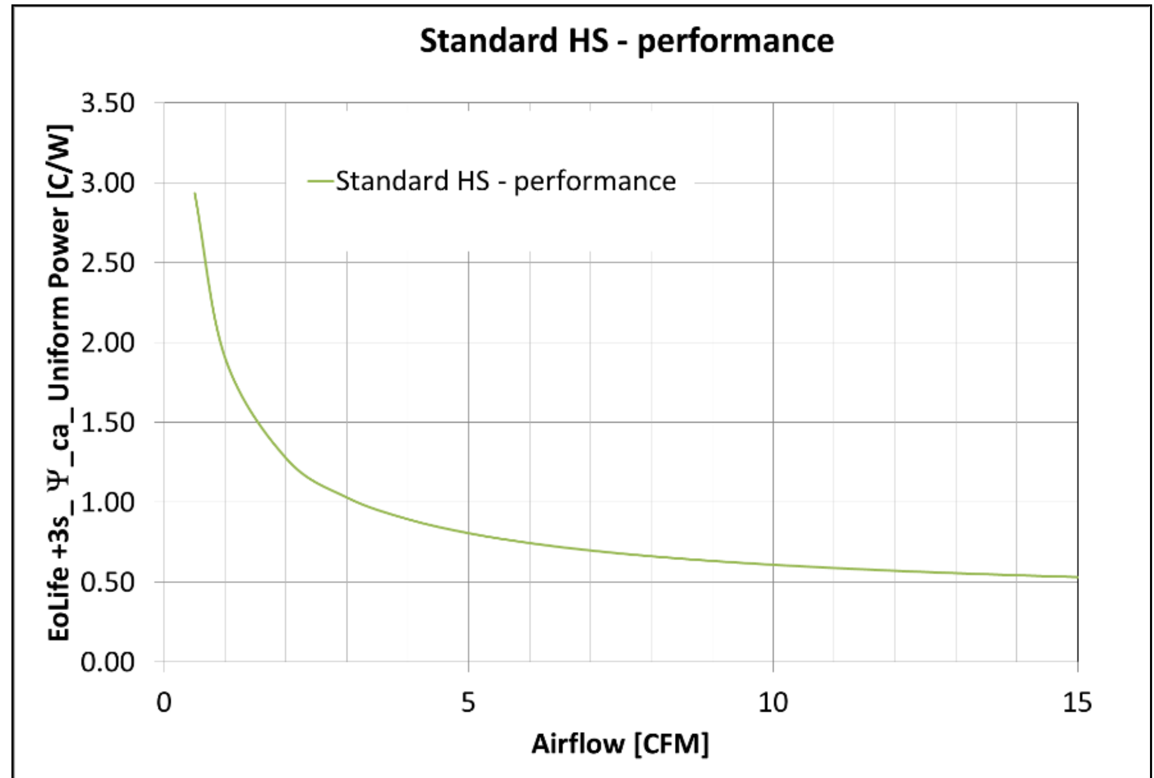
Standard Heatsink Performance Curve

Heatsink performance (Ψ_{CA}, °C/W) as a function of airflow (CFM)

EoLife Ψ_{ca} **+3*σ = α + β*(CFM)$^{-\gamma}$**

α	0.303
β	1.600
γ	0.718
3σ	0.018





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ENTERPRISE STORAGE SEGMENT REFERENCE THERMAL SOLUTION

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Storage Form Factors

- Storage Bridge Bay
  - Common canister definition for Storage enclosure.
  - Refer to SBB Specification v.2.1 located at http://www.sbbwg.org/sbb_specification/
- 1U Cloud Storage
  - Low cost, 1U rack mount chassis using 3.5" hard drives.

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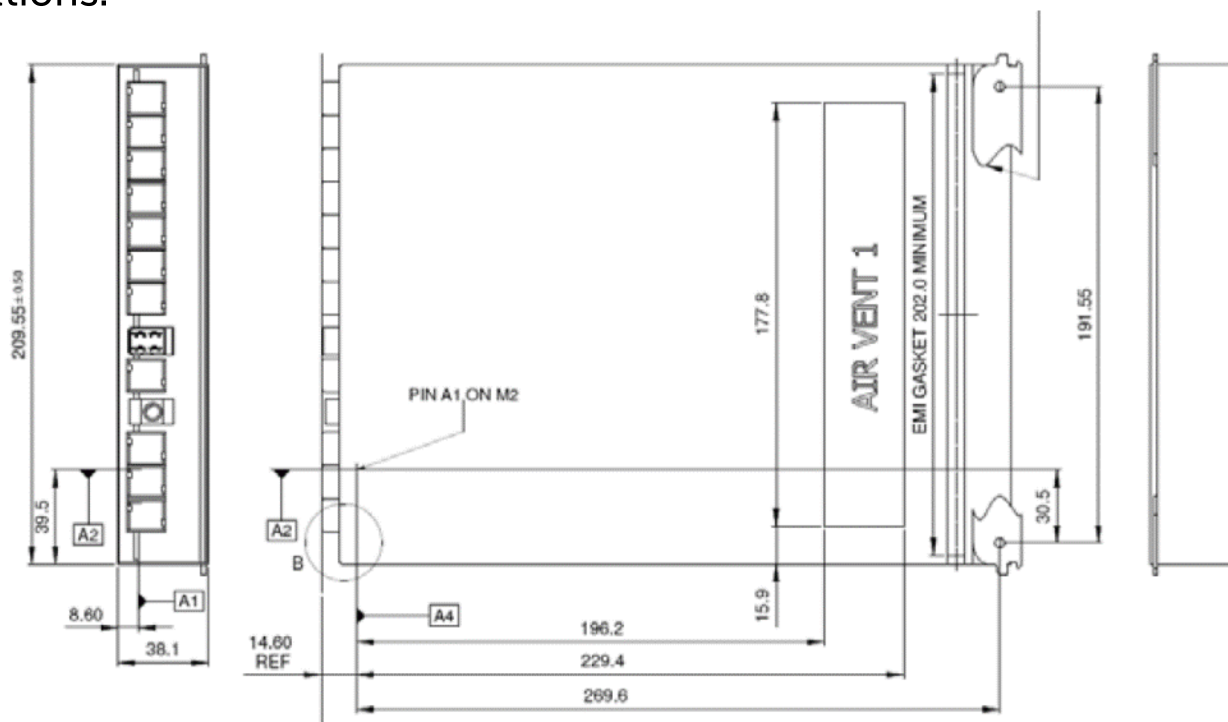
Storage Bridge Bay Overview

- Typically two SBB canisters plug into a midplane within chassis along with HDDs and PSUs.
- Overall maximum canister dimensions: 209.55 mm (W) x 284.5 mm (L) x 38.1 mm (H)
- Clearance above board for heatsinks: 27.5 mm (for 1 mm sheetmetal thickness)
- Airflow enters chassis at connector end and exits through one of two venting configurations.



For details, refer to the SBB Specification v.2.1 located at www.sbbwg.org

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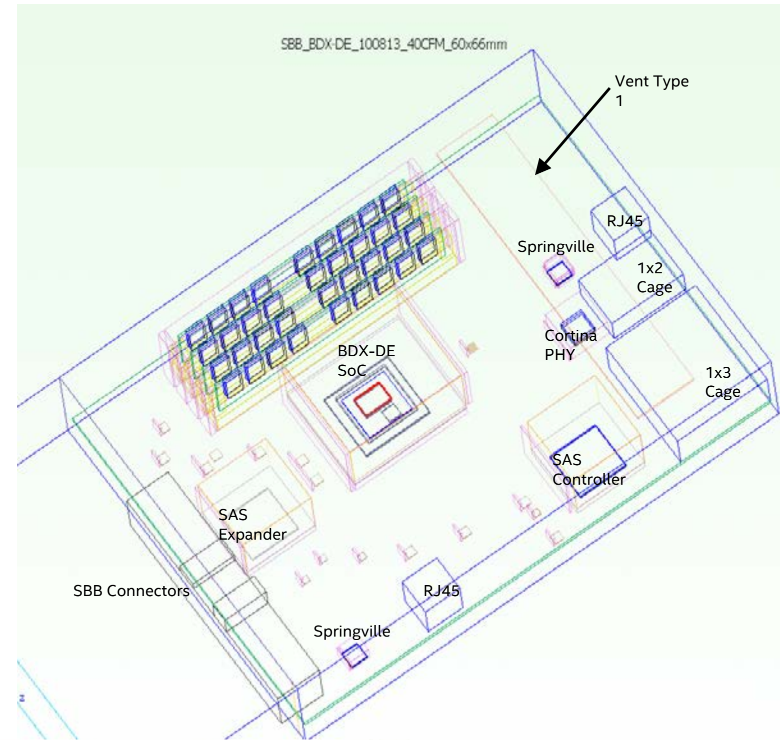
SBB System Thermal Assumptions

- Chassis configuration: 2U with 24 2.5" HDDs
- Chassis external ambient: 35 °C
- Canister inlet ambient: 45 °C
- Canister airflow: 40 CFM
- Target exit temperature: 50 °C
- Vent 1 configuration – due to excessive airflow bypass of the BDX-DE heatsink, Vent 2+3 configuration is not recommended for reference heatsink implementation.
- Trabuco Canyon Customer Reference Board layout.

SBB Canister FloTHERM Model



2U Chassis w/ 24 HDDs (Front)

2U Chassis w/ 24 HDDs (Rear)

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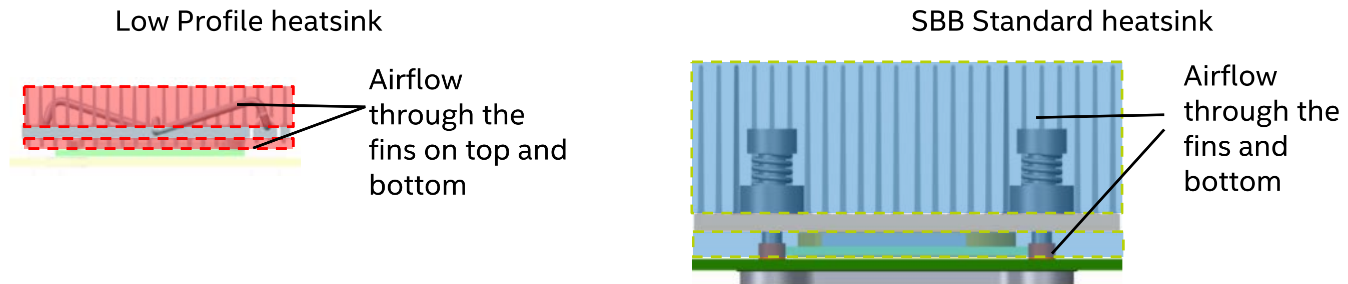
System Reference Boundary Conditions

SoC Power Range SKU	Reference heatsink Concept	Local ambient Temperature, T_{la} (˚C)	Airflow through heatsink (CFM)	Notes
35W	SBB- Standard	48	3.9	1
25W	Low profile (11 mm height)	48	2.7	1
25W	Low profile++ (19 mm height)	48	1.5	1
20W	Low profile	48	1.5	1

Notes:
1. These specifications are based on initial pre-silicon simulations, which will be updated as further characterization data becomes available.



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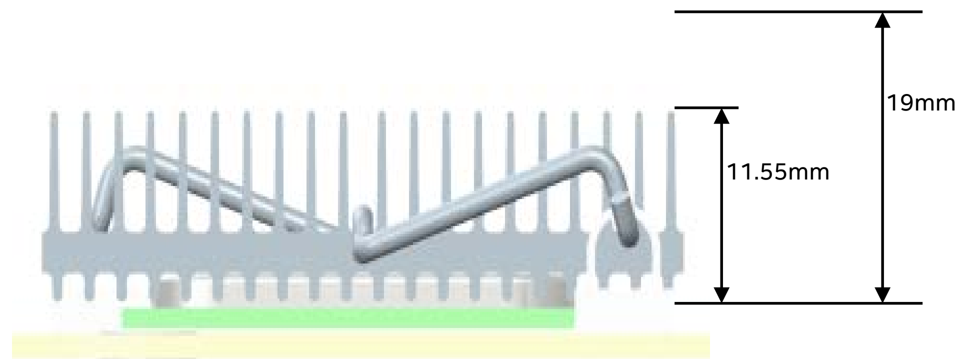
Heatsink application guidelines for Storage SKUs ≤25W

- The low profile heatsink can be used for Storage SKUs with TDP ≤20W in a SBB Canister.

- For the 25W SKU, the low profile heatsink requires increased airflow of 2.7 CFM through the heatsink. Alternatively, the heatsink height can be increased to 19 mm using same airflow rate (40 CFM canister flow).



Low Profile Heatsink

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SBB Standard Heatsink Mechanical Design - Storage

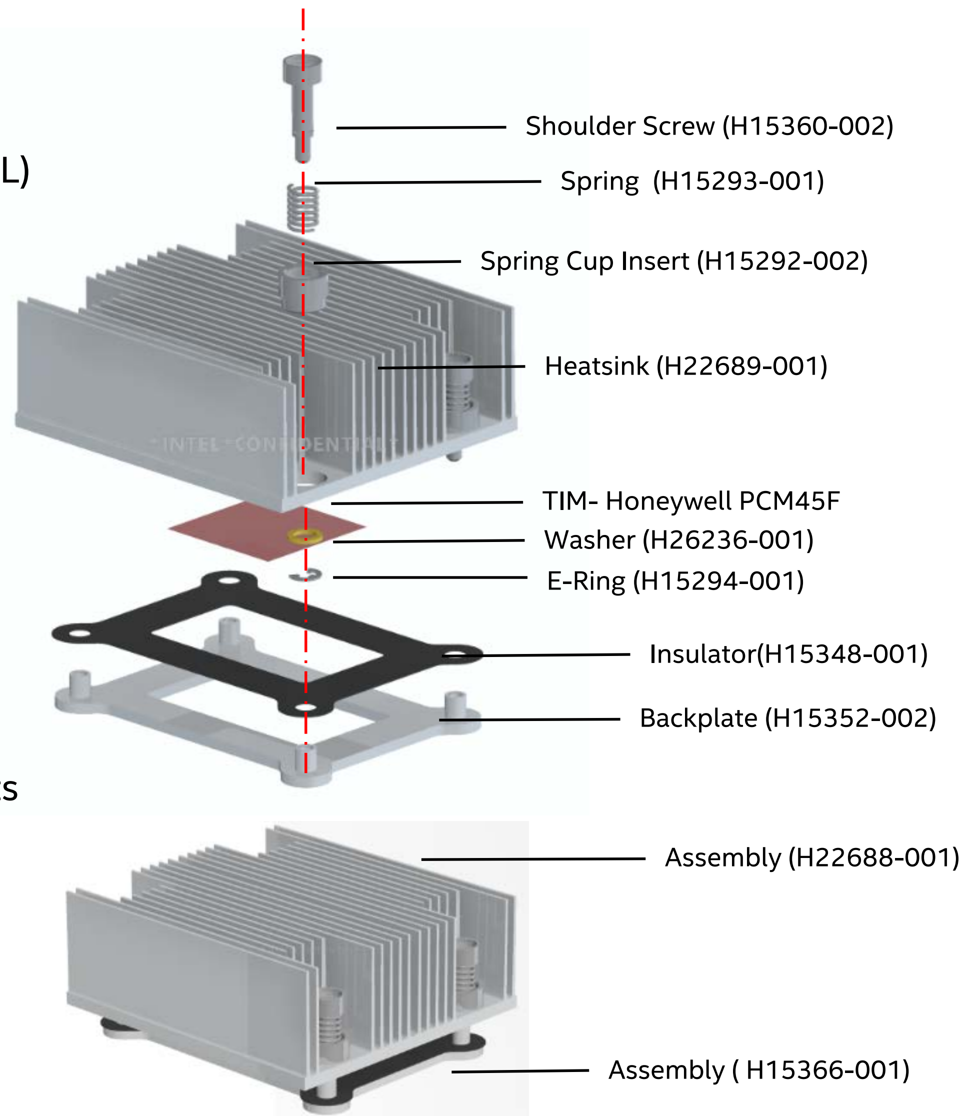
SBB Standard heatsink

- Material: Extruded aluminum heatsink
- Overall heatsink dimensions: 60mm (W) x 66mm (L) x 23.5mm (H)
- Retention: four screws with backplate
- TIM: PCM45F
  - Min required load is 27 lbf* EOLife
- #Fins: 24 (21mm tall)
- Pitch: 2.5 mm
- Base thickness: 2.5 mm
- Backplate is mainly used to provide higher TIM force
- Target power is >25W

See Appendix D for mechanical drawings, some parts can be found in Appendix B.

See Appendix H for supplier info.

*Note: design consideration for adequate thermal performance



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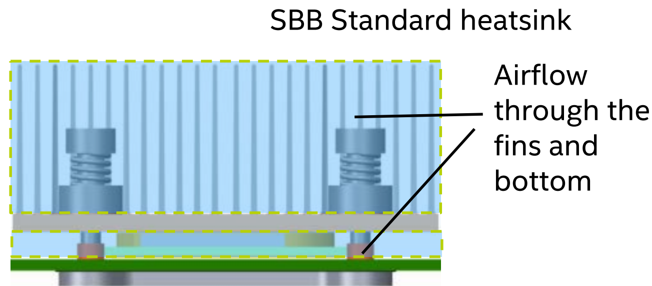
SBB Standard Heatsink Performance Curve

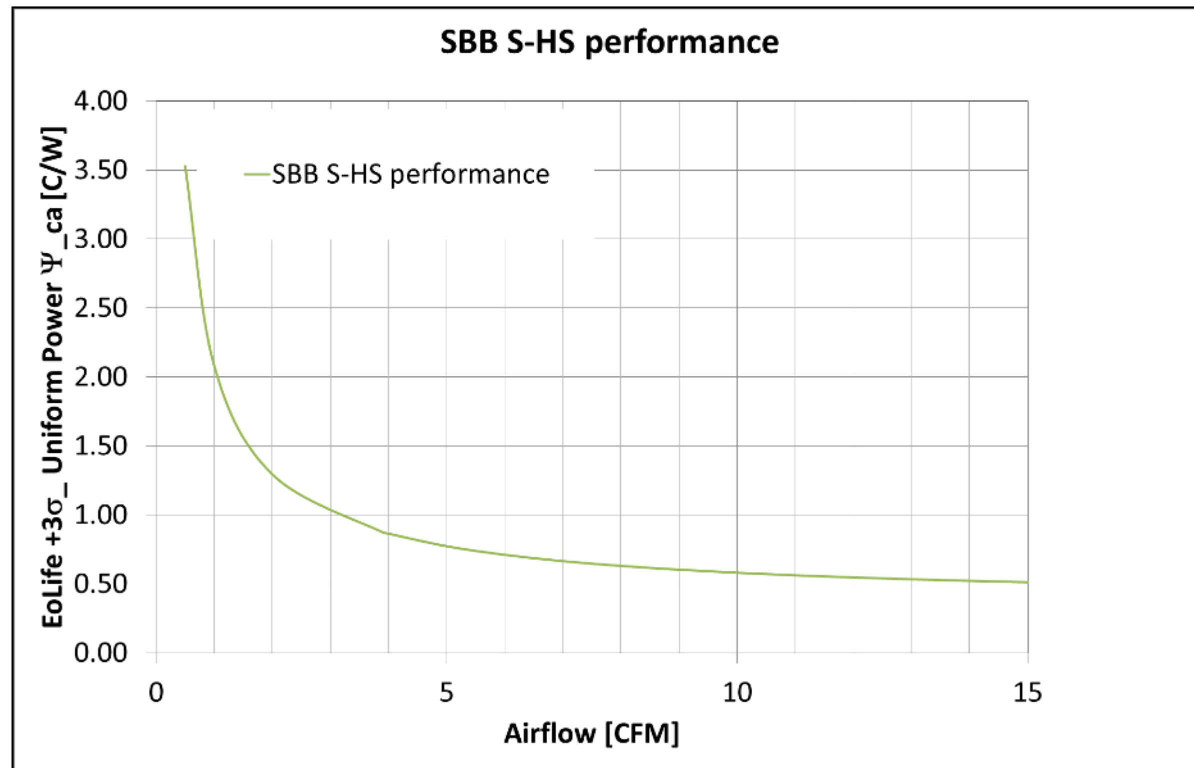
Performance (Ψ_{ca}, °C/W) as a function of airflow (CFM)

EoLife Ψ_{ca} $+3*\sigma = \alpha + \beta*(\text{CFM})^{-\gamma}$

α	0.392
β	1.732
γ	0.876
3σ	0.042

SBB Standard heatsink





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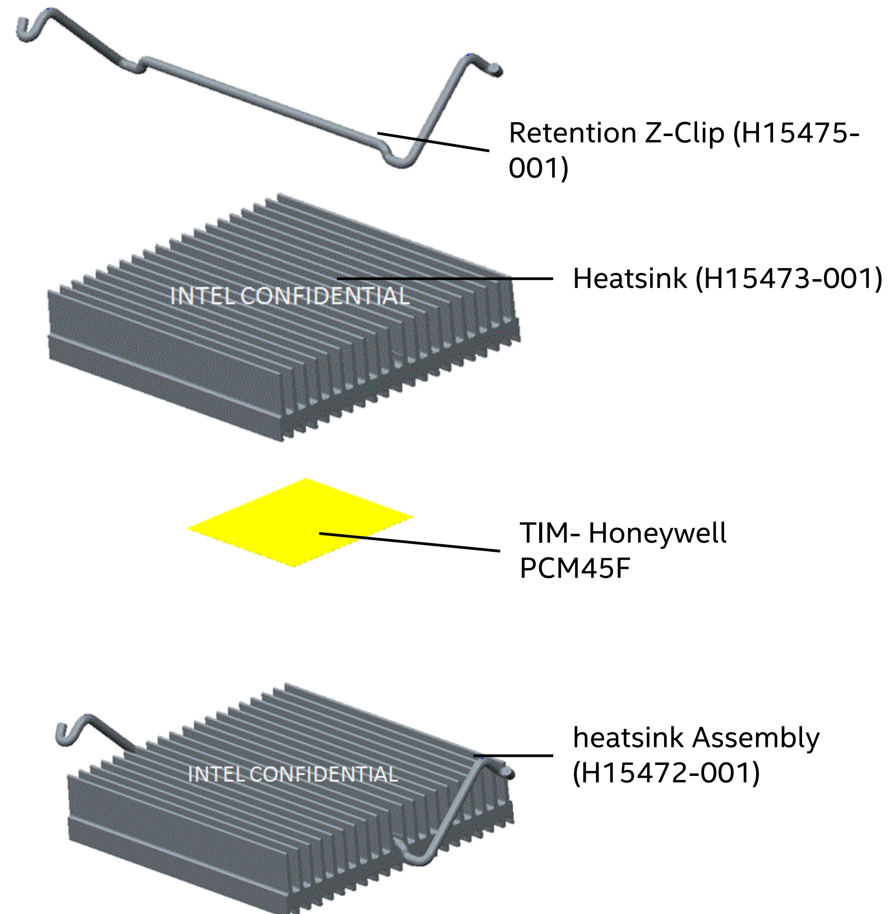
Low Profile Heatsink Mechanical Design – Storage

Low profile Storage heatsink

- Material: Extruded aluminum heatsink
- Overall heatsink dimensions: 50mm(W)x54mm(L)x11.35mm(H)
- Retention: Z-clip/baseboard anchors
- TIM: PCM45F
  - Min required load is 18Lbf* EOLife
- #Fins: top 20 (7.35mm tall), bottom 21(1.5mm tall)
- Fin Pitch: 2.5mm(top and bottom)
- Base thickness: 2.5mm
- Target power is <=20W

See Appendix C for mechanical drawings and Appendix H for supplier info.

*Note: design consideration for adequate thermal performance



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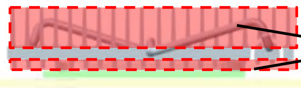
Low Profile Heatsink Performance Curve

Performance (C/W) as a function of airflow (CFM)

EoLife $\Psi_{ca} + 3*\sigma = \alpha + \beta*(CFM)^{-\gamma}$

α	0.563
β	1.981
γ	0.782
3σ	0.06

Low Profile Heatsink



Airflow through the fins on top and bottom

Low profile HS- performance

—Low profile HS- performance

EoLife +3σ_Ψ_ca_Uniform Power [C/W]

4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00

0
5
10
15

Airflow [CFM]

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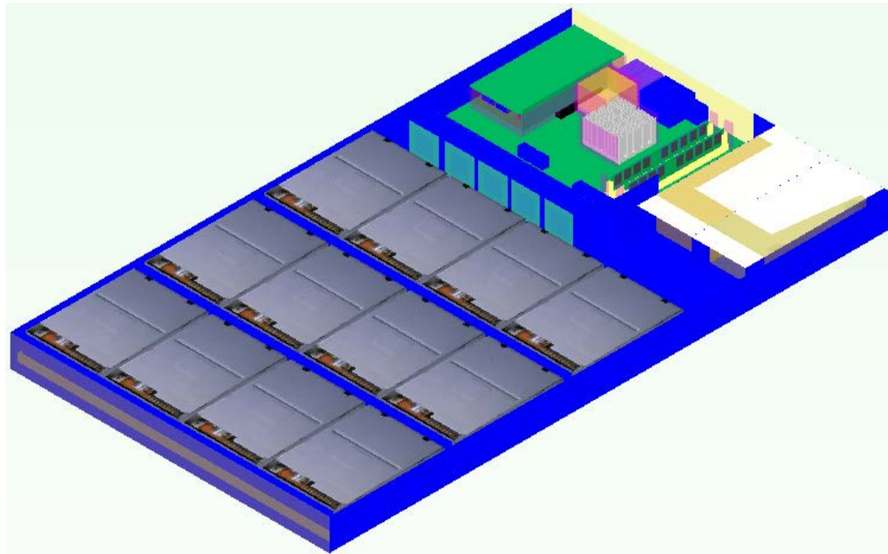
1U Cloud Storage Overview - Example

- Low cost, high density storage using standard 1U chassis.
- Typically 15 3.5" HDDs mounted in front of chassis, with fans located mid chassis between HDDs and motherboard.
- 40 mm fans positioned for fan fail cooling scenarios.
- Rotational vibration (RV) interference from array of HDDs needs to be mitgated. Some options include:
  - Choice of HDD (Enterprise vs. Consumer, RV tolerant).
  - HDD mounting using vibration damping materials.



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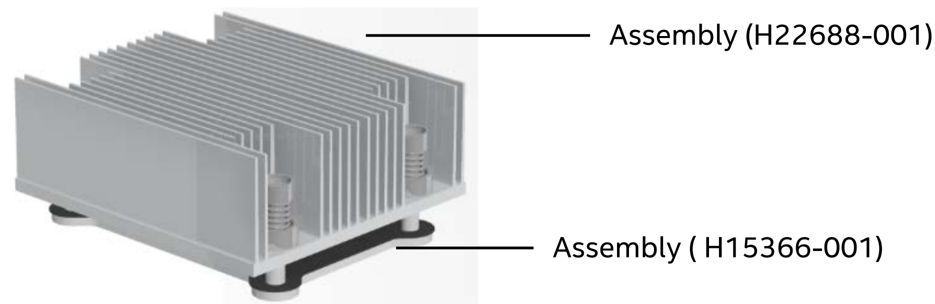
1U Cloud Storage Reference Heatsink Design

- The following SoC heatsink boundary conditions are assumed for typical 1U rackmount Cloud Storage systems:
  - Local ambient temperature = 50 °C
  - Flow through heatsink (through fins and under heatsink) = 4.9 CFM
  - No fan failure
- Thermal simulation results show that the Storage Bridge Bay reference heatsink is able to cool all Storage SKUs in a 1U Cloud Storage system.
  - For a fan failure of a fan directly in front the heatsink, performance may be significantly impacted.
  - Since the heatsink height was defined for the SBB form factor, additional thermal headroom can be obtained by by increasing fin height and reducing airflow bypass over the top of the heatsink.



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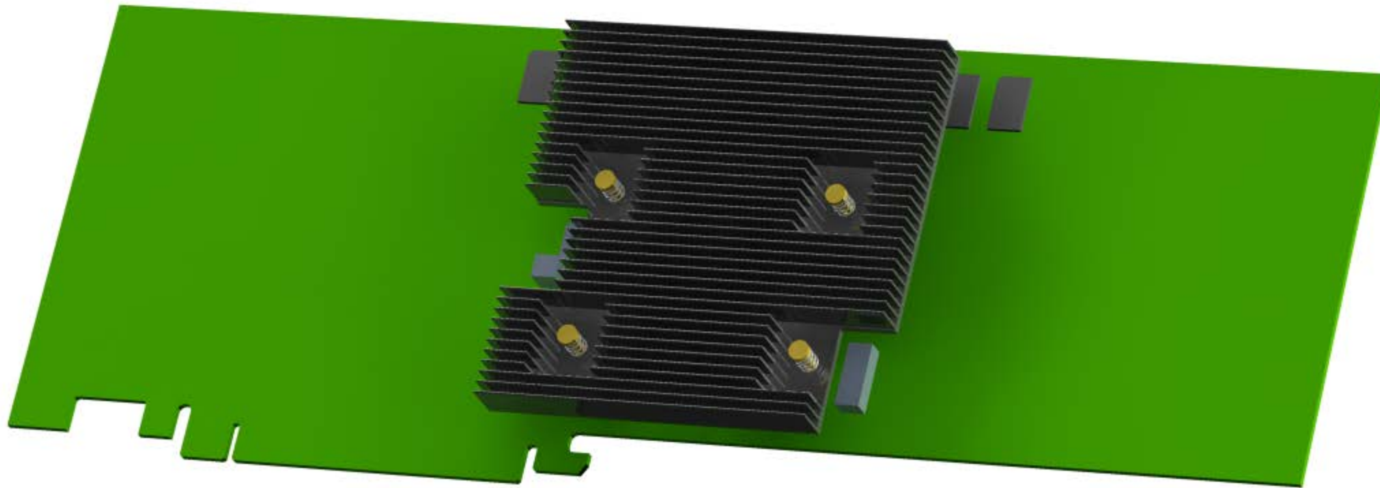
PCIe* Storage Host Bus Adapter Overview

- Storage Host Bus Adapter (HBA) plugs into enterprise storage server PCIe* slot.
- Typically ¾ to full length PCIe form factor.
- PCI component height specification:
  - Primary side max height = 14.47 mm
  - Secondary side max component height = 2.35 mm



Intel® Xeon® Processor D-1500 Product Family SoC Reference Heatsink for PCIe HBA form factor (H54534-001)

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PCIe* Storage Host Bus Adapter Reference Heatsink Design

- The following SoC heatsink boundary conditions are assumed for worst case PCIe* thermal environment:
  - Local ambient temperature = 55 °C
  - Airflow approach velocity = 150 LFM (linear ft/min)
- Reference heatsink design details:
  - 93 mm x 93 mm x 10.2 mm
  - Extruded aluminum
  - Four (4) brass off-the-shelf spring loaded push pins (ITW* 84FT02-129)
- Thermal simulation results show that the PCIe HBA reference heatsink is able to cool Storage SKUs with TDP below 20 W.

Note*: The reference heatsink has not been validated and is presented as a concept only. Users should conduct their own thermal and mechanical validation testing prior to using in production.*

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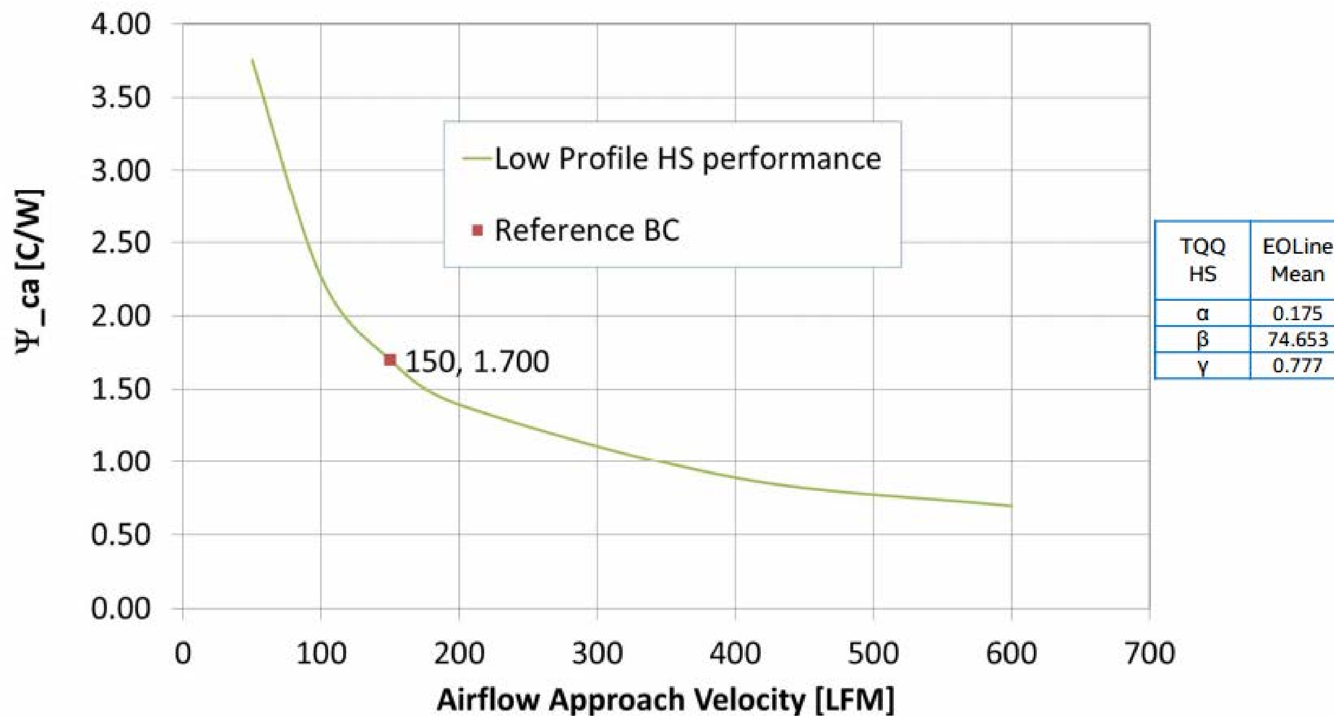
PCIe* Storage Host Bus Adapter Reference Heatsink Performance

- The following mean heatsink performance curve was derived:
  - An adjustment of +0.13 °C/W is recommended to account for 3sigma variation and TIM degradation for End Of Life.
  - The non-uniform heating correction factor provided here should be added as well.



TQQ HS	EOLine Mean
α	0.175
β	74.653
γ	0.777

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COMMUNICATIONS SEGMENT REFERENCE THERMAL SOLUTION

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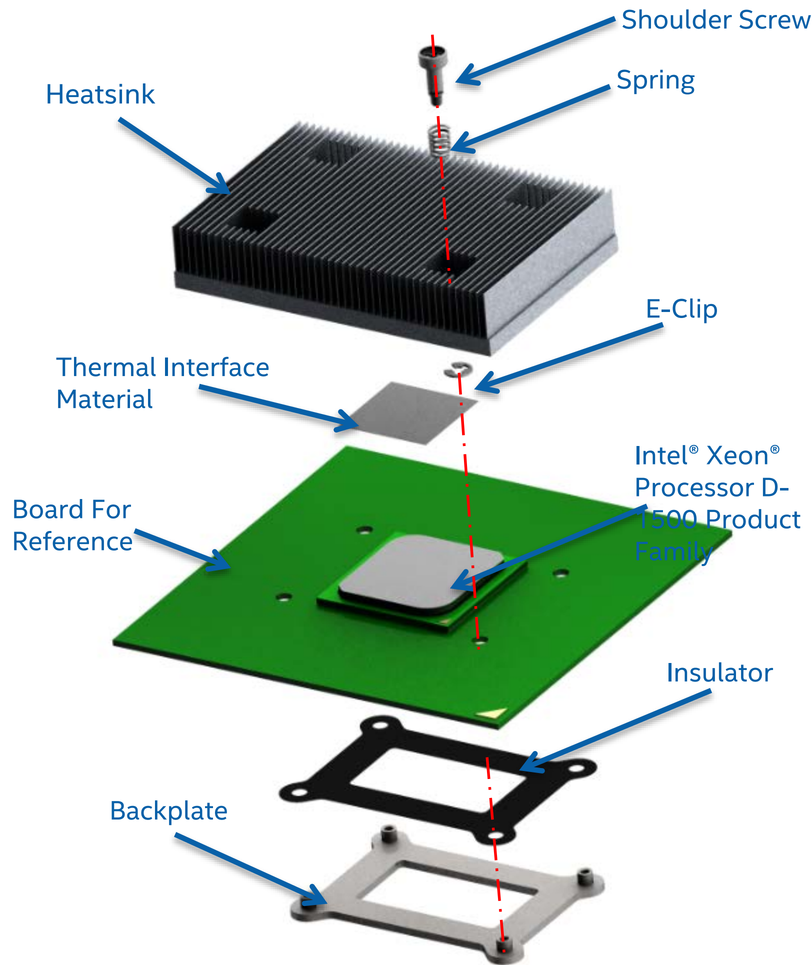
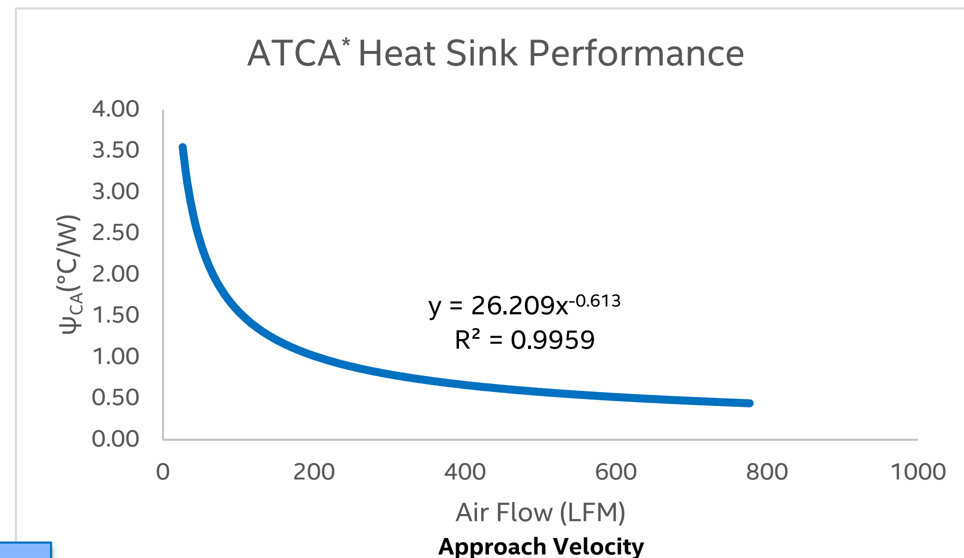
ATCA* Reference Heatsink Design



Detailed ATCA* heatsink Properties	
Material	Aluminum (Al), k =200 W/m-K or better
Overall Dimensions (mm)	90 x 60 x 17
Base Thickness (mm)	4.5
Fin Height (mm)	12.5
Fin Thickness (mm)	0.3
# of Fins	45



- Performance data is based on test data.
- The non-uniform heating correction factor provided here should be added as well.
- See Appendix D for detailed mechanical drawings.

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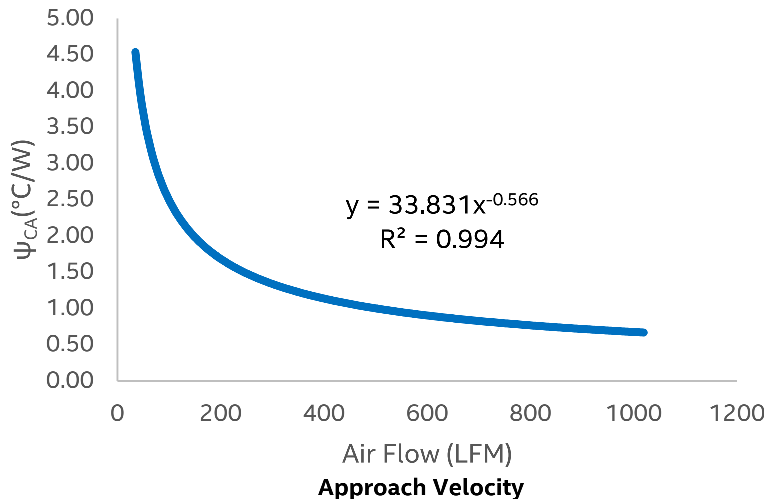
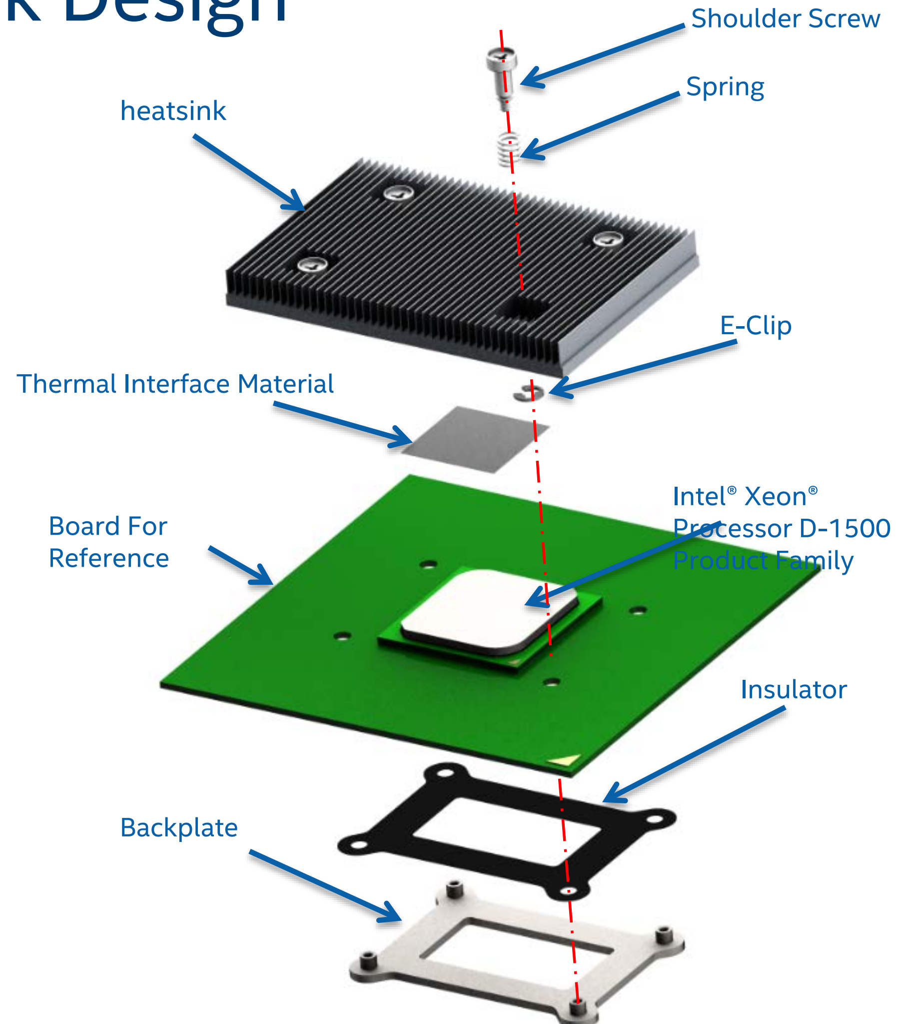
CPCI* Reference Heatsink Design

Detailed CPCI* Heatsink Properties	
Material	Aluminum (Al), k =200 W/m-K or better
Overall Dimensions (mm)	90 x 60 x 9.25
Base Thickness (mm)	3.0
Fin Height (mm)	6.25
Fin Thickness (mm)	0.3
# of Fins	45





- Performance data is based on test data.
- The non-uniform heating correction factor provided here should be added as well
- See Appendix E for detailed mechanical drawings.

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APPENDIX A – INTEL® XEON® PROCESSOR D-1500 PRODUCT FAMILY PACKAGE MECHANICAL DRAWING

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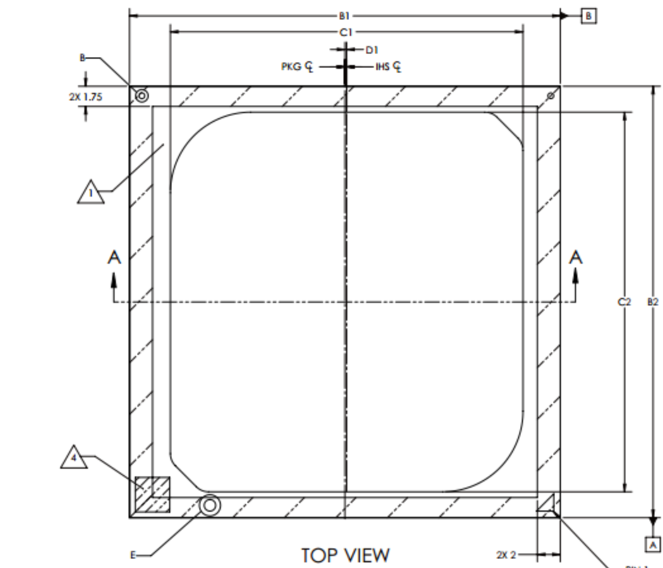
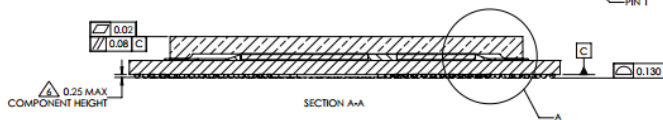
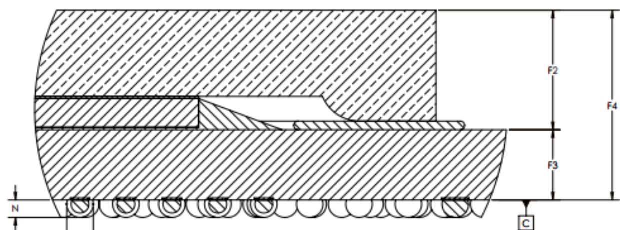
DWG. NO. G99702 SH. 1 REV. 03

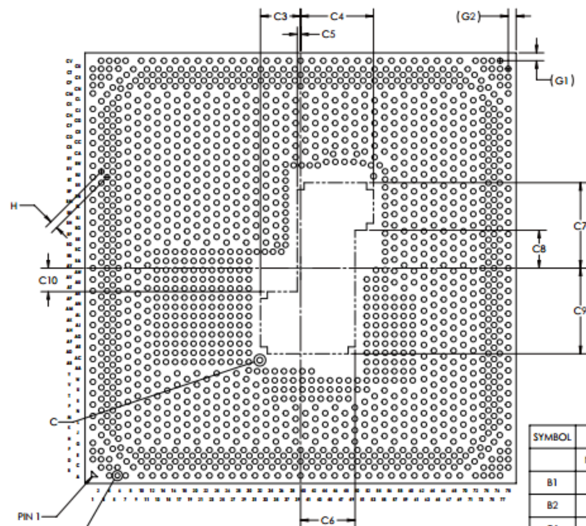
NOTES:

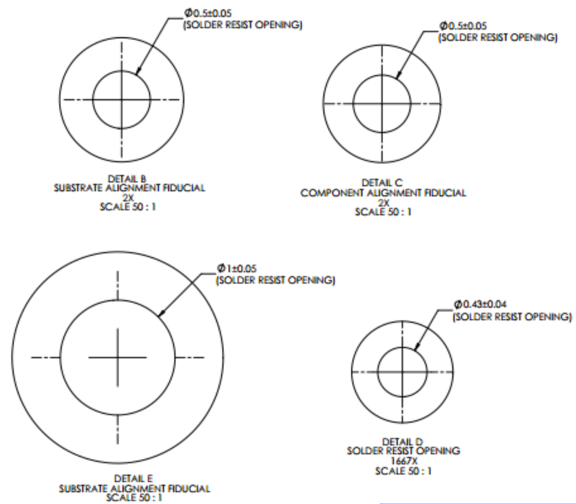
1. COMPONENT KIZ.
2. ALL TOLERANCES ARE RSS.
3. ALL Z STACKUP HEIGHT ESTIMATES ARE BASED ON PRE-SMT BALL HEIGHT.
4. MARK KOZ. NO COMPONENTS ALLOWED.
5. NOMINAL PACKAGE MASS = 20 GRAMS. ACTUAL WEIGHT MAY VARY DUE TO MANUFACTURING PROCESS.
6. IT IS ALLOWABLE FOR PACKAGE COMPONENTS TO CONTACT THE BOARD IN BGA DEPOP UNDER THE PACKAGE. NO BOARD COMPONENTS ARE ALLOWED IN THIS AREA.











SYMBOL	MILLIMETE NOM.	TOL.	COMMENTS
B1	37.5	± 0.05	
B2	37.5	± 0.05	
C1	30.7	± 0.05	⊕ 0.5 C B
C2	33	± 0.05	⊕ 0.5 C A
C3	3.491	N/A	
C4	6.343	N/A	
C5	0.291	N/A	
C6	4.743	N/A	
C7	7.443	N/A	
C8	3.304	N/A	
C9	7.458	N/A	
C10	2.046	N/A	
D1	0.154	N/A	
F2	2.08	± 0.078	
F3	1.222	± 0.105	OPTION 1
	1.438	± 0.105	OPTION 2
F4	3.302	± 0.131	OPTION 1
	3.518	± 0.131	OPTION 2
F5	3.556	±0.076	OPTION 1 — POST SMT TOTAL STACKUP HEIGHT BASED UPON LIMITED DATA FROM INTEL REFERENCE BOARD DESIGN
	TBD	TBD	OPTION2
G1	0.685	N/A	MINIMUM SPACING FROM BGA PAD CENTER TO TO PACKAGE EDGE
G2	0.685	N/A	
H	0.7	N/A	MIN PITCH FOR BALLS ANYWHERE PATTERN — ⊕ Ø 0.14 C A B / Ø 0.04 C
N	0.303	±0.05	PRE-SMT BGA HEIGHT
P	0.462	±0.05	PRE-SMT BGA BALL DIAMETER

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5-2009.

MATERIAL:

FINISH:

DESIGNED BY | DATE

DRAWN BY | DATE

CHECKED BY | DATE

APPROVED BY | DATE

THIRD ANGLE PROJECTION

DEPARTMENT

intel — 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119

TITLE: PACKAGE MECHANICAL DRAWING

SIZE: A1 | DRAWING NUMBER: G99702 | REV: 03

SCALE: 5:1 | DO NOT SCALE DRAWING | SHEET 1 OF 3

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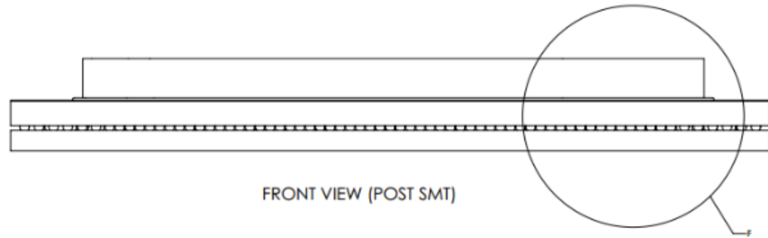
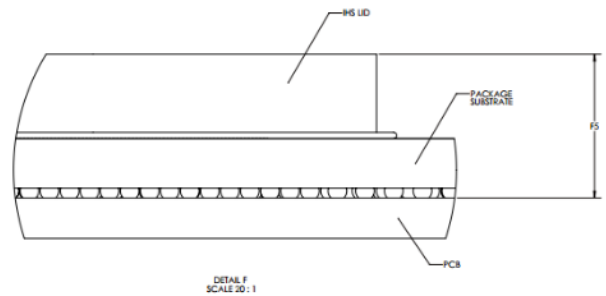
DWG. NO. G99702 SH. 2 REV. 03



FRONT VIEW (POST SMT)



DETAIL F
SCALE 20 : 1

DEPARTMENT | 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119 | SIZE A1 | DRAWING NUMBER G99702 | REV 03 | SCALE: 10:1 | DO NOT SCALE DRAWING | SHEET 2 OF 3

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APPENDIX B – STANDARD HEATSINK MECHANICAL DRAWINGS

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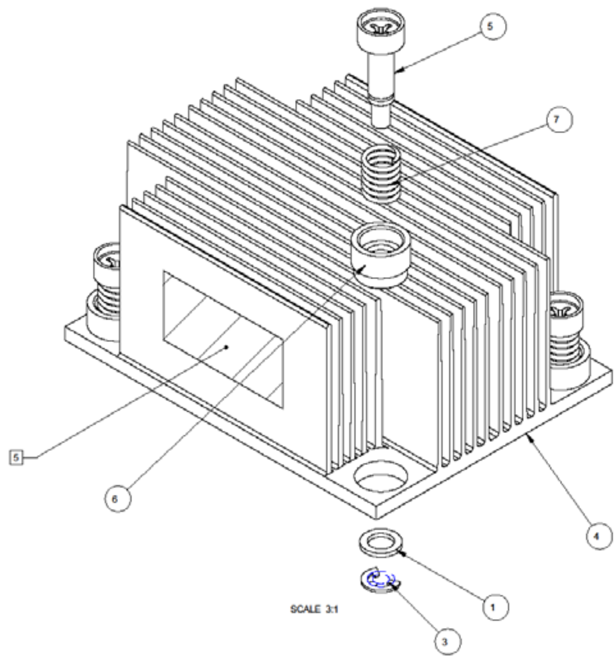
DWG. NO	SHT.	REV
H15289	1	A

REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPR
-	01	PRELIMINARY	6-19-13	TAB
	02	CHANGE NOTE 7 FOR CLARITY	8-20-13	HRK
	03	ADD DELRIN WASHER ITEM 1, CHANGE SPRING CUP ITEM 6	10-11-13	HRK
	04	PART NUMBER CHANGED- WAS:H15289-001,IS:H15289-002	10-28-13	HRK



NOTES:

1. THIS DRAWING TO BE USED IN CORRELATION WITH SUPPLIED 3D DATABASE FILE. ALL DIMENSIONS AND TOLERANCES ON THIS DRAWING TAKE PRECEDENCE OVER SUPPLIED FILE.
2. PRIMARY DIMENSIONS STATED IN MILLIMETERS, [BRACKETED] DIMENSIONS STATED IN INCHES. CRITICAL TO FUNCTION DIMENSION.
3. ALL DIMENSION AND TOLERANCES PER ANSI Y14.5-1994.
4. REMOVE ALL BURRS, SHARP EDGES, GREASES, AND/OR SOLVENTS AFTER FINAL ASSEMBLY.

[5] PART NUMBER AND TORQUE SPEC MARK.
PLACE PART NUMBER AND TORQUE SPEC IN ALLOWABLE AREA, EITHER SIDE OF PART WHERE SHOWN. BELOW PART NUMBER CALLOUT, PLACE THE FOLLOWING TEXT:

"RECOMMENDED SCREW TORQUE: 8 IN-LBF"

THE MARK CAN BE AN INK MARK, LASER MARK, PUNCH MARK OR ANY OTHER PERMANENT MARK THAT IS READABLE AT 1.0X MAGNIFICATION.

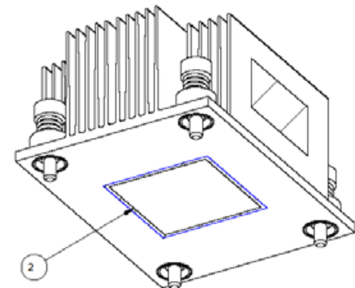
[6] PRESS FIT BOTTOM OF CUP LIP FLUSH TO TOP SURFACE OF HEAT SINK.

[7] ITEM 5 TO BE PRESSED INTO ITEM 3 (4 PLC),MINIMUM PUSH OUT FORCE = 30 LBF PER CUP, SEE SHEET 2.

[8] CRITICAL TO FUNCTION DIMENSION.

[9] INSTALL E-RING SO BURR/PUNCH DIRECTION/SHARP EDGE IS AWAY FROM BASE CUP SURFACE.

[10] ALLOWABLE PROTRUSION OF CUP FROM BASE.



PARTS LIST

QTY	ITEM NO	PART NUMBER	DESCRIPTION
4	7	H15293-001	SPRING HEATSINK REFERENCE BDX-DE
4	6	H15292-002	BVC SPRING CUP INSERT
4	5	H15360-002	BVC HEATSINK SHOULDER SCREW
1	4	H15291-001	BVC HEATSINK EXTRUSION
4	3	H15294-001	BCV HS E-RING
1	2	BVC-R-TIM	25X25 HONEYWELL PCM45-F
4	1	H26236-001	WASHER HS DELRIN BDX-DE
	TOP	H15289-002	TOP ASSEMBLY

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 DIMENSIONS ARE IN MM TOLERANCES: PER DRAWING DIMENSIONS

THIRD ANGLE PROJECTION

DESIGNED BY	DATE
H. KOFSTAD	6-19-13
DRAWN BY	DATE
T. BOYD	6-19-13
CHECKED BY	DATE
-	-
APPROVED BY	DATE
-	-
MATERIAL	FINISH
SEE NOTES	SEE NOTES

DEPARTMENT: PMCI

intel
2200 MISSION COLLEGE BLVD.
P.O. BOX 58119
SANTA CLARA, CA 95052-8119

TITLE: HEATSINK ASSY,REFERENCE, STANDARD,BROADWELL-DE

SIZE	DRAWING NUMBER	REV
D	H15289	04

SCALE: 2:1 | DO NOT SCALE DRAWING | SHEET 1 OF 2

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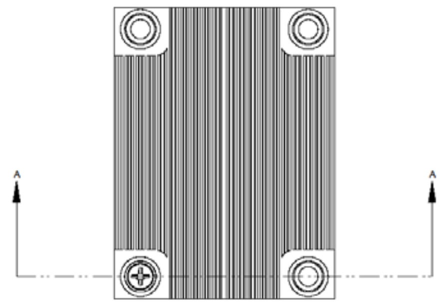
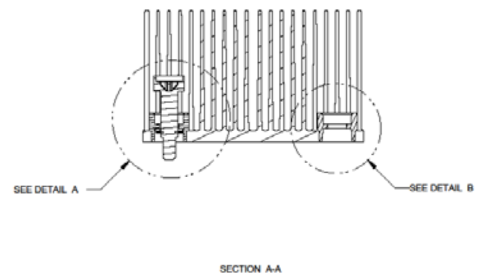
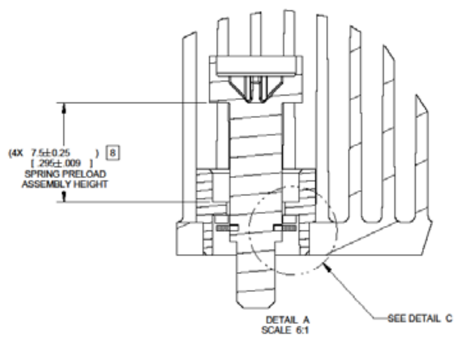


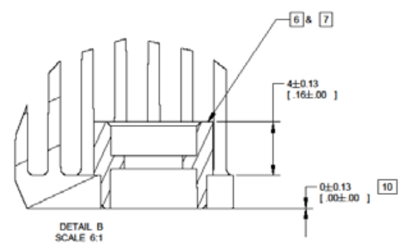


SECTION A-A



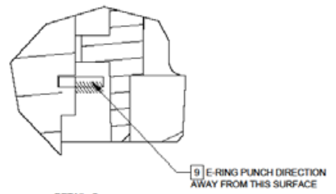
DETAIL A
SCALE 6:1

ASSEMBLY DETAIL



DETAIL B
SCALE 6:1

PRESS FIT DETAIL



DETAIL C
SCALE 12:1

E-RING ORIENTATION DETAIL

DEPARTMENT		SIZE	DRAWING NUMBER	REV
-	intel 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119	D	H15289	04
		SCALE: 2:1	DO NOT SCALE DRAWING	SHEET 2 OF 2

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DWG. NO	H15291	SHT.	1	REV	A

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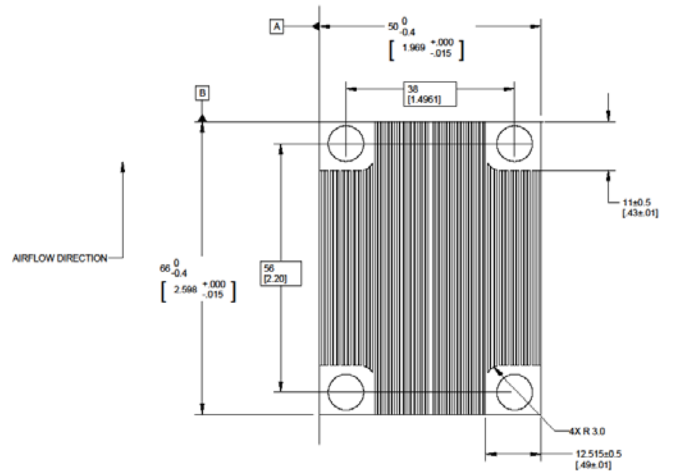
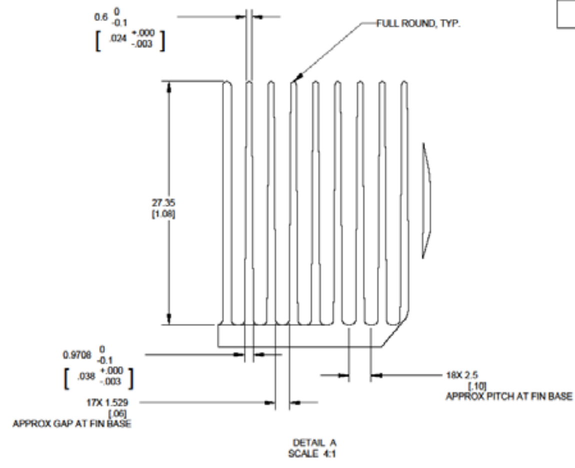
REVISION HISTORY

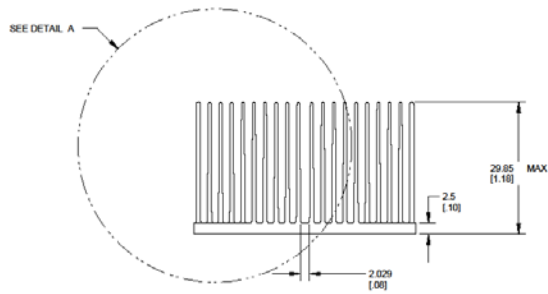
ZONE	REV	DESCRIPTION	DATE	APPR
-	01	PRELIMINARY	6-19-13	TAB
	02	CHANGE PER DFM INPUT,THICKEN OUTSIDE FINS, ADD RADIUS TO CORNERS,INCREASE CORNER CUTOUT SIZE	8-27-13	HRK

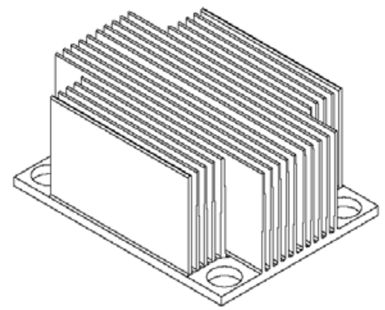




NOTES:

1. THIS DRAWING TO BE USED IN CONJUNCTION WITH SUPPLIED 3D DATABASE FILE. ALL DIMENSIONS AND TOLERANCES ON THIS DRAWING TAKE PRECEDENCE OVER SUPPLIED FILE.
2. PRIMARY DIMENSIONS STATED IN MILLIMETERS, [BRACKETED] DIMENSIONS STATED IN INCHES. CRITICAL TO FUNCTION DIMENSION.
3. ALL DIMENSION AND TOLERANCES PER ANSI Y14.5-1994.
4. HEAT SINK VOLUMETRIC. ALL HEAT SINK GEOMETRY MUST FIT WITHIN THE SPACE DEFINED BY THIS DRAWING..
6. REMOVE ALL BURRS, SHARP EDGES, GREASES, AND/OR SOLVENTS AFTER MACHINING AND FIN ASSEMBLY.
7. LOCAL FLATNESS ZONE .076 MM [0.003"] CENTERED ON HEAT SINK BASE.
8 (boxed) CRITICAL TO FUNCTION DIMENSION.
9. MATERIAL: 6063 -T5 SERIES ALUMINUM OR EQUIVALENT
   MINIMUM K = 216 W/M-K





PARTS LIST

QTY	ITEM NO	PART NUMBER	DESCRIPTION
	TOP	H15291-001	-

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 DIMENSIONS ARE IN MM TOLERANCES: PER DRAWING DIMENSIONS

THIRD ANGLE PROJECTION

DESIGNED BY	DATE
H. KOFSTAD	6-19-13
DRAWN BY	DATE
T. BOYD	6-19-13
CHECKED BY	DATE
-	-
APPROVED BY	DATE
-	-
MATERIAL	FINISH
SEE NOTES	SEE NOTES

DEPARTMENT: PMCI

Intel, 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119

TITLE: HEATSINK,EXTRUSION,REFERENCE, STANDARD,BROADWELL-DE

SIZE	DRAWING NUMBER	REV
D	H15291	02

SCALE: 2:1 | DO NOT SCALE DRAWING | SHEET 1 OF 2

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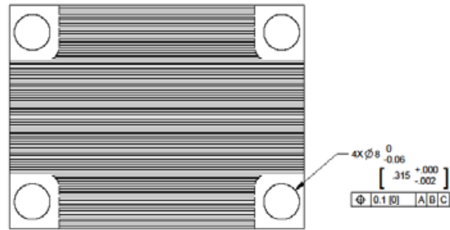

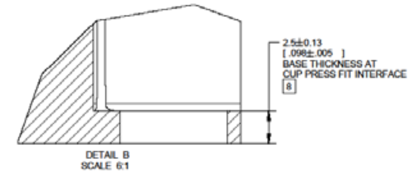

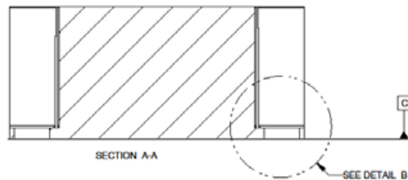

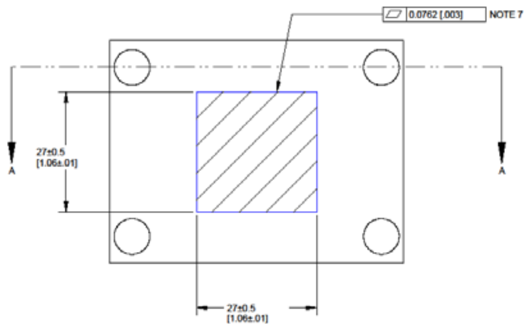

DEPARTMENT	2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119	SIZE D	DRAWING NUMBER H15291	REV 01
-		SCALE: 2:1	DO NOT SCALE DRAWING	SHEET 2 OF 2

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Backplate for 62 mil thick boards (56-76 mils range)

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DWG. NO H15366 SHT. 1 REV 0

REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPR
-	04	CHANGE PART NUMBER-WAS:H15366-001 IS:H15366-002	10-28-13	HRK
	05	ADD NOTE 1 PART MARKING, ADD VIEW	12-13-13	HRK
	06	ADD BOM TO DRAWING	4-11-14	HRK
	07	REDESIGN STANDOFF, BUMP PART NUMBER TO H15366-003	4-30-14	HRK

1

2

1

NOTES:

1 PART TO BE MARKED WITH INTEL PART NUMBER, SUPPLIER (MPN), AND DATE CODE. PART NUMBER SHOWN IN TABLE BELOW.

QTY	ITEM NO	PART NUMBER	DESCRIPTION
1	2	H15352-003	
1	1	H15348-001	
	TOP	H15366-003	

PARTS LIST

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994
DIMENSIONS ARE IN INCHES
TOLERANCES:
.X ± 0 Angles ± 0.5°
.XX ± 0.01
.XXX ± 0.005

THIRD ANGLE PROJECTION

DESIGNED BY	DATE
.	
DRAWN BY	DATE
H.KOFSTAD	6-18-13
CHECKED BY	DATE
.	.
APPROVED BY	DATE
MATERIAL SEE NOTES	FINISH SEE NOTES

DEPARTMENT .

intel 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119

TITLE BACKPLATE,ASSY,REFERENCE, STANDARD,BROADWELL-DE

SIZE D | DRAWING NUMBER H15366 | REV 07

SCALE: 3 | DO NOT SCALE DRAWING | SHEET 1 OF 1

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Backplate for 62 mil thick boards (56-76 mils range)

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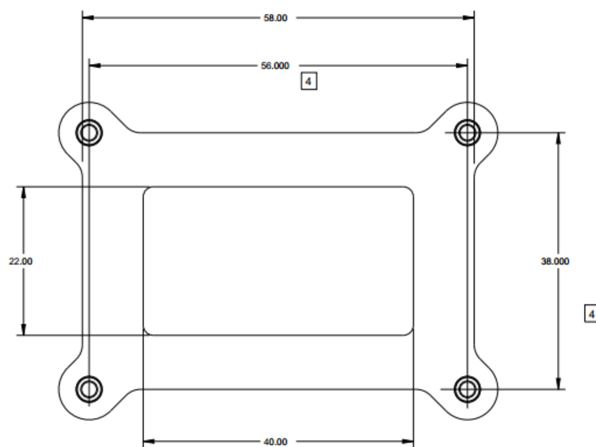
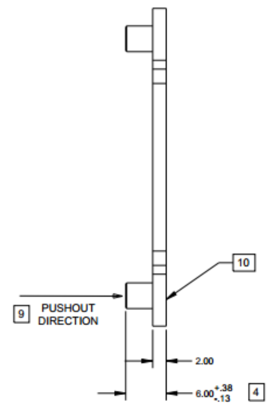
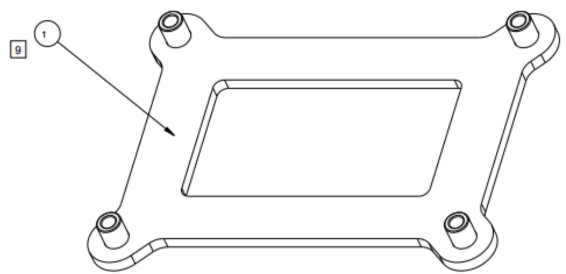
DWG. NO	SHT.	REV
H15352	1	0

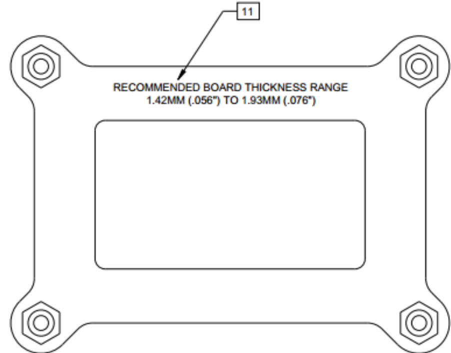
REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPR
-	06	CHANGE MATERIAL CALLOUT ON STANDOFF PART H19331	10-28-13	HRK
	07	CHANGE PLATING NOTE 3 TO NICKEL,ADD PROCESS TEST	10-30-13	HRK
	08	ADD NOTE 9,TORQUE-OUT AND PUSH-OUT SPECS	3-4-14	HRK
	09	ADD BOM TO FACE OF DWG, ADD "MINIMUM" TO NOTE 9, T-O P-O	4-11-14	HRK
	10	CHANGE DIMENSION 6.13MM TO 6.00MM +.38 -.13 (ZONE B-5) ADD PUSHOUT DIRECTION FOR STANDOFFS (ZONE B-5)	4-14-14	HRK
	11	REDESIGN STANDOFF H19331-003, BUMP PART NUMBER TO H15352-003	4-30-14	HRK
	12	ADD MARKING CALLOUT, NOTE 11	7-1-14	HRK









NOTES; UNLESS OTHERWISE SPECIFIED:

1. REFERENCE DOCUMENTS
   ASME Y14.5M-1994 - STANDARD DIMENSION AND TOLERANCES
   UL1439 - UL SHARP EDGE TESTING
   164997 - INTEL MARKING STANDARD
   A29419 - INTEL TOLERANCE STANDARD FOR SHEETMETAL
   C25432 - INTEL COSMETIC SPEC FOR SHEETMETAL
2. FEATURES NOT SPECIFIED ON DRAWING AND FEATURES WITHOUT SPECIFIED TOLERANCE SHALL BE CONTROLLED BY 3D CAD DATABASE, AND SHALL CONFORM TO SHEETMETAL TOLERANCE STANDARD (A29419).
3. MATERIAL: MAY USE INTEL ENGINEERING APPROVED EQUIVALENT.
   A) TYPE:SHEET STEEL, SK7, 1065, S50C, OR CHSP60PC- 2.00 MM+/-0.05 THK
   B) CRITICAL MECHANICAL PROPERTIES:
   HEAT TREATED TO 250 MPa MINIMUM YIELD
   TENSILE YIELD STRENGTH (ASTM D638) >= 250 MPa
   ULTIMATE TENSILE STRENGTH (ASTM D638) >= 300 MPa
   C) PLATING: 2 MICROMETERS MINIMUM ELECTROLYTIC NICKEL.
   PROCESS TEST: 168 HRS 85°C/85% HUMIDITY WITH NO VISIBLE CORROSION.
4. DIMENSIONS ARE CRITICAL TO FUNCTION DIMENSIONS (CTF).
5. PART SHALL BE FREE OF OIL AND DEBRIS.
6. BURR HEIGHTS SHALL NOT EXCEED .15MM.
7. SHARP CORNERS MUST BE CHAMFERED, OR ROUNDED TO 0.25MM MAX.
8. PART TO BE FLAT WITHIN 0.125MM.
9. TORQUE OUT- 13 IN.LBS. (1.47N-m) MINIMUM
   PUSH OUT FORCE- 50 LBS. (222N) MINIMUM
10. INSTALL ALL STUDS FLUSH TO THIS SURFACE. +000 -.25.
11. MARK PART APPROXIMATELY WHERE SHOWN WITH THE FOLLOWING INFORMATION, 2MM HIGH CHARACTERS, COLOR-BLACK,INK MARK OR PUNCH MARK. "RECOMMENDED BOARD THICKNESS RANGE 1.42MM (.065") TO 1.93MM (.076")".

PARTS LIST

QTY	ITEM NO	PART NUMBER	DESCRIPTION
4	2	H19331-003	
1	1	H15352-003	
	TOP	H15352-003	

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994
DIMENSIONS ARE IN MILLIMETERS
TOLERANCES:
Angles ± .5°
.XX ± .10 MM
.XXX ± .05 MM

THIRD ANGLE PROJECTION

DESIGNED BY	DATE
.	
DRAWN BY	**DATE**
H.KOFSTAD	6-18-13
CHECKED BY	**DATE**
.	.
APPROVED BY	**DATE**
MATERIAL	**FINISH**
SEE NOTES	SEE NOTES

DEPARTMENT: .

intel — 2200 MISSION COLLEGE BLVD.
P.O. BOX 58119
SANTA CLARA, CA 95052-8119

TITLE: BACKPLATE,CPU,REF,STD,BDX-DE 1.42MM TO .076MM PCB THICKNESS RANGE

SIZE	DRAWING NUMBER	REV
D	H15352	12

SCALE: 3.000 | DO NOT SCALE DRAWING | SHEET 1 OF 1

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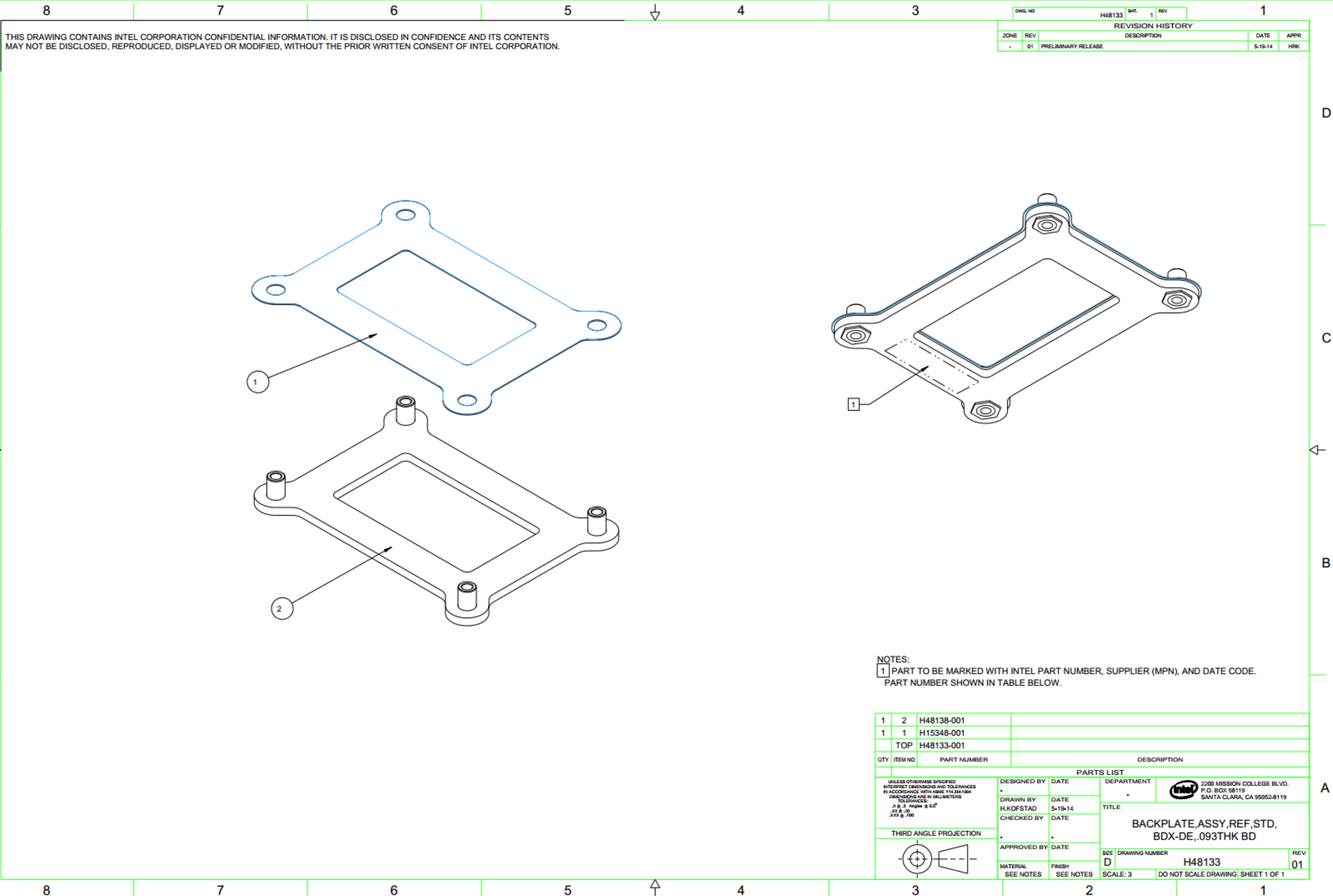
Backplate for 93 mil thick boards (76-103 mils range)



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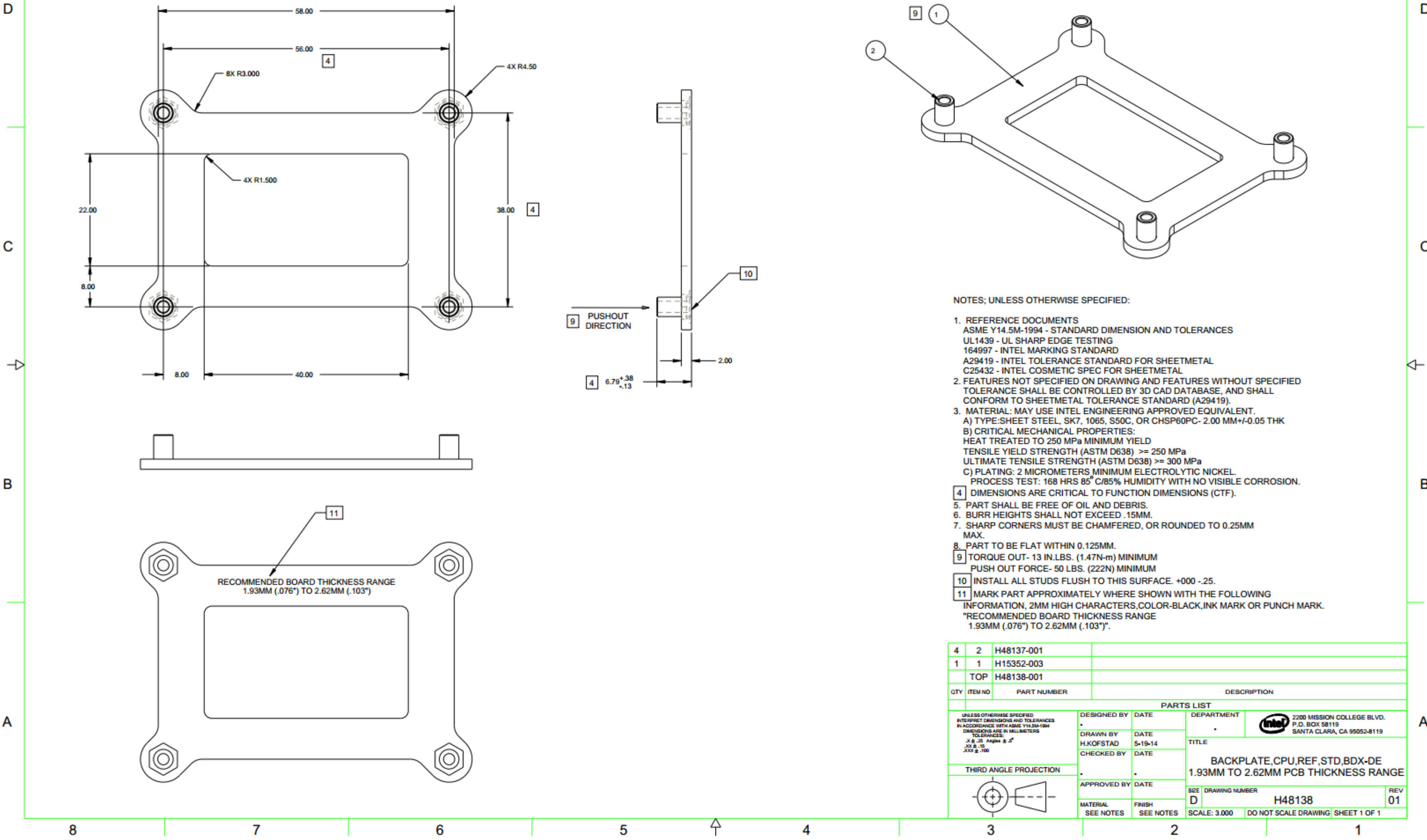
Backplate for 93 mil thick boards (76-103 mils range)



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DWG. NO H15348-001 | SHT. 1 | REV

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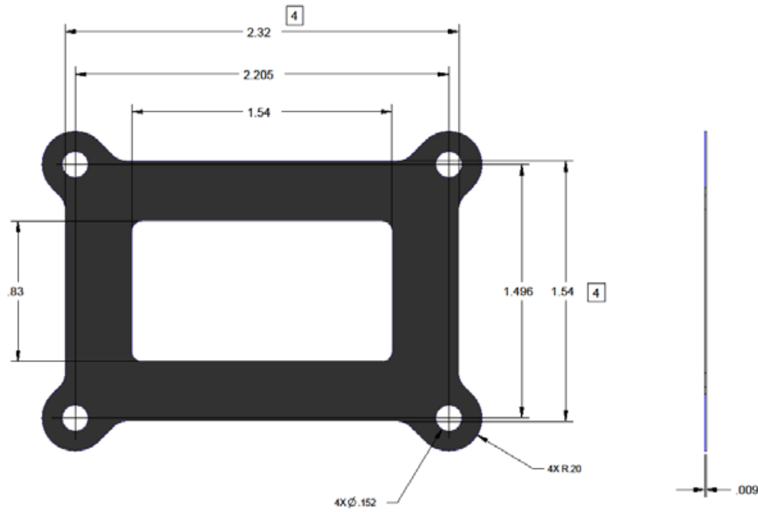
REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPR
-	01	PRELIMINARY RELEASE	6-18-13	HRK
	02	REDESIGN, SMALLER FOOTPRINT	7-24-13	HRK
	03	ADD ADHESIVE TO BOTH SIDES, CHANGE THICKNESS FROM .007" TO .009"	8-16-13	HRK



NOTES; UNLESS OTHERWISE SPECIFIED:

1. REFERENCE DOCUMENTS
   ASME Y14.5M-1994 - STANDARD DIMENSION AND TOLERANCES
2. FEATURES NOT SPECIFIED ON DRAWING AND FEATURES WITHOUT SPECIFIED TOLERANCE SHALL BE CONTROLLED BY 3D CAD DATABASE.

[3] MATERIAL: MAY USE INTEL ENGINEERING APPROVED EQUIVALENTS.
CRITICAL MECHANICAL PROPERTIES:
ALL SUBSTANCES IN THIS PART MUST CONFORM TO INTEL ENVIRONMENTAL PRODUCT SPECIFICATION 18-1201.
A) HALOGEN FREE POLYCARBONATE SHEET PC-1860B (CHENGDU KANGLONGXIN PLASTICS CO.,LTD.)
.005" NOMINAL THICKNESS, BOTH SIDES ADHESIVE APPLIED; TOTAL THICKNESS= .009".ADHESIVE BACKING PAPER TO REMAIN ON OUTER SURFACE.
B) FLAMMABILITY: UL 94-V0 OR VTM-0 RATING.

[4]. DIMENSIONS ARE CRITICAL TO FUNCTION DIMENSIONS (CTF).

QTY	ITEM NO	PART NUMBER	DESCRIPTION
	TOP	H15348-001	

PARTS LIST

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 DIMENSIONS ARE IN INCHES TOLERANCES: Angles ±.5° .XX ± .01 .XXX ± .005	DESIGNED BY -	DATE	DEPARTMENT -	intel 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119
	DRAWN BY H.KOFSTAD	DATE	TITLE INSULATOR,BACKPLATE,REFERENCE, STANDARD, BROADWELL-DE	
THIRD ANGLE PROJECTION	CHECKED BY -	DATE -		
	APPROVED BY	DATE	SIZE D / DRAWING NUMBER H15348	REV 03
	MATERIAL SEE NOTES	FINISH SEE NOTES	SCALE: 3.000 / DO NOT SCALE DRAWING	SHEET 1 OF 1

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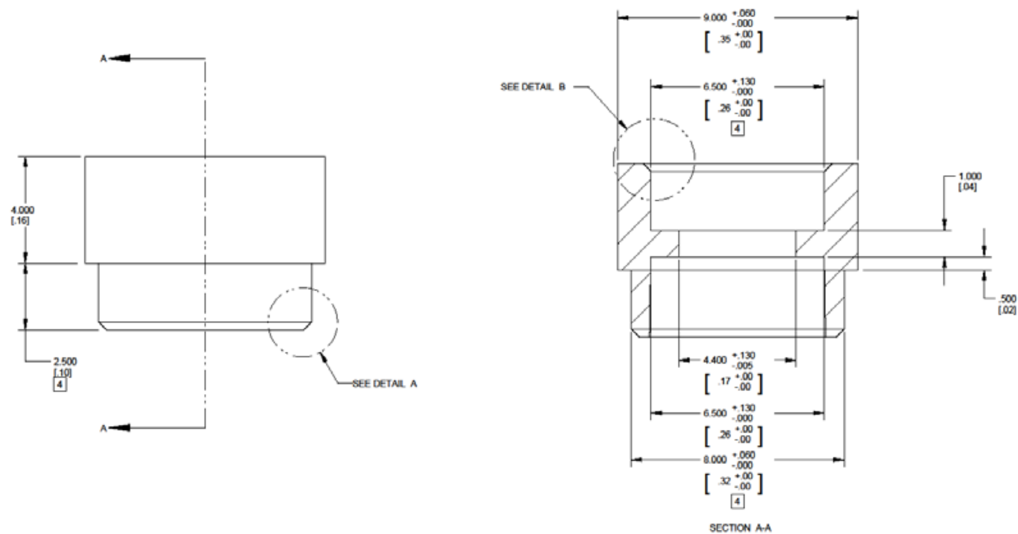
DWG. NO H15292 SHT. 1 REV A

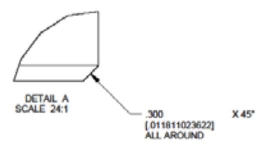
REVISION HISTORY

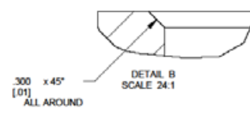
ZONE	REV	DESCRIPTION	DATE	APPR
-	01	PRELIMINARY	6-10-13	TAB
	02	MOVE INSIDE SHOULDER .50MM,ADD .50 DIMENSION,ZONE C4	10-11-13	HRK
	03	CHANGE PART NUMBER- WAS:H15292-001 IS:H15292-002	10-28-13	HRK

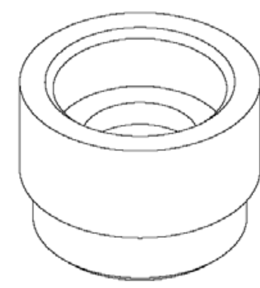


NOTES:

1. THIS DRAWING TO BE USED IN CONJUNCTION WITH SUPPLIED 3D DATABASE. ALL DIMENSIONS AND TOLERANCES ON THIS DRAWING TAKE PRECEDENCE OVER SUPPLIED DATABASE.
2. PRIMARY DIMENSIONS STATED IN MILLIMETERS. [BRACKETED] DIMENSIONS STATED IN INCHES.
3. MATERIAL: SUS301, 304, 430
4. CRITICAL TO FUNCTION DIMENSION







PARTS LIST

QTY	ITEM NO	PART NUMBER	DESCRIPTION
	TOP	H15292-002	-

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994. DIMENSIONS ARE IN MILLIMETERS. TOLERANCES: X.X ± .5 Angles ± 0.5° .XX ± .25

THIRD ANGLE PROJECTION

DESIGNED BY	DATE
H. KOFSTAD	6-19-13
DRAWN BY	DATE
T. BOYD	6-19-13
CHECKED BY	DATE
-	-
APPROVED BY	DATE
-	-
MATERIAL	FINISH
SEE NOTES	SEE NOTES

DEPARTMENT: PMCI

intel — 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119

TITLE: HEATSINK,INSERT,SPRING,REFERENCE, STANDARD,BROADWELL-DE

SIZE	DRAWING NUMBER	REV
D	H15292	03

SCALE: 12:1 | DO NOT SCALE DRAWING | SHEET 1 OF 1

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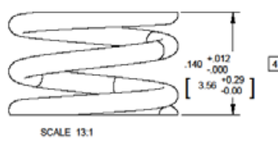
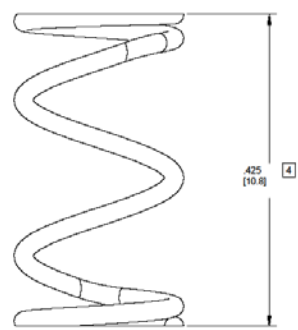
DWG. NO	SHT.	REV
H15293	1	02

REVISION HISTORY

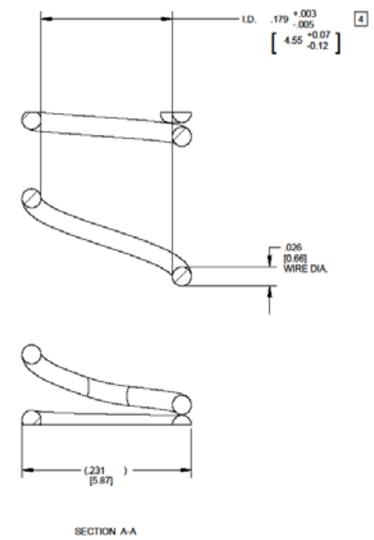
ZONE	REV	DESCRIPTION	DATE	APPR
-	02	PRELIMINARY, MODIFIED DIMS TO IMPROVE LOAD RANGE	8-14-13	TAB
	03	CHANGE SPRING RATE TOLERANCE FROM 10% TO 5%	8-20-13	HRK
	04	CHANGE OUTSIDE DIAMETER TO REFERENCE DIMENSION	8-27-13	HRK



SOLID HEIGHT



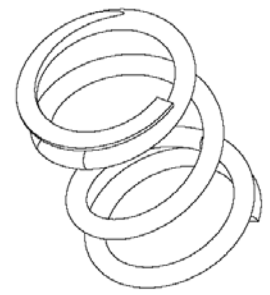
FREE HEIGHT



NOTES:

1. THIS DRAWING TO BE USED IN CONJUNCTION WITH SUPPLIED 3D DATABASE. ALL DIMENSIONS AND TOLERANCES ON THIS DRAWING TAKE PRECEDENCE OVER SUPPLIED DATABASE.
2. PRIMARY DIMENSIONS STATED IN INCHES [BRACKETED] DIMENSIONS STATED IN MILLIMETERS.
3. SPRING RATE: K=6.67 +/- .33 N/MM [K=38.1 +/- 1.9 LBF/IN] 4
   FREE HEIGHT: 10.8 MM [0.4250 IN]
   SOLID HEIGHT: 3.56 MM [0.140 IN]
   WIRE DIAMETER: 0.711 MM [0.028 IN]
   TOTAL COILS: 4.0 (ONLY TOTAL COILS SHOWN IN THIS DRAWING)
   ACTIVE COILS: 2.0
   ENDS: GROUND & CLOSED
   TURN: LEFT HAND (AS SHOWN IN VIEWS)
   MATERIAL: MUSIC WIRE, ASTM A228 OR JIS-G-3522
   FINISH: ZINC PLATED
   OTHER GEOMETRY: PER THIS DRAWING

4 CRITICAL TO FUNCTION DIMENSION



	TOP	H15293-00X	-
QTY	ITEM NO	PART NUMBER	DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 DIMENSIONS ARE IN MM TOLERANCES: PER DRAWING DIMENSIONS

THIRD ANGLE PROJECTION

DESIGNED BY: H. KOFSTAD	DATE: 6-20-13
DRAWN BY: T. BOYD	DATE: 6-20-13
CHECKED BY: - -	DATE: - -
APPROVED BY: -	DATE: -
MATERIAL: SEE NOTES	FINISH: SEE NOTES

DEPARTMENT: PMCI

2200 MISSION COLLEGE BLVD.
P.O. BOX 58119
SANTA CLARA, CA 95052-8119

TITLE: SPRING,HEATSINK,REFERENCE, STANDARD,BROADWELL-DE

SIZE	DRAWING NUMBER	REV
D	H15293	04

SCALE: 14:1 | DO NOT SCALE DRAWING | SHEET 1 OF 1

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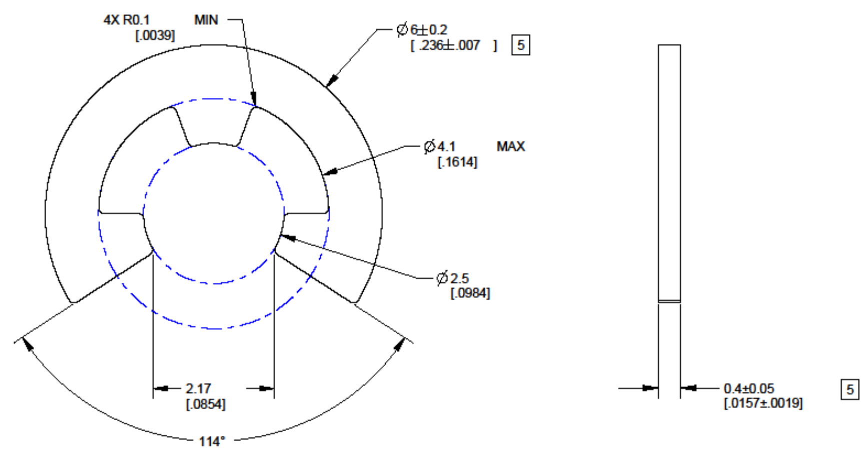
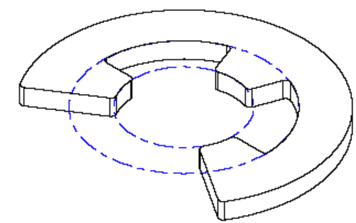
REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPR
-	01	PRELIMINARY	6-19-13	TAB
	02	REDESIGN,CHANGE OD,ID,ANGLE	10-11-13	HRK



NOTES:

1. THIS DRAWING TO BE USED IN CONJUNCTION WITH SUPPLIED 3D DATABASE. ALL DIMENSIONS AND TOLERANCES ON THIS DRAWING TAKE PRECEDENCE OVER SUPPLIED DATABASE.
2. PRIMARY DIMENSIONS STATED IN MILLIMETERS. [BRACKETED] DIMENSIONS STATED IN INCHES.
3. MATERIAL: SPRING STEEL OR STAINLESS STEEL
   YIELD STRENGTH >= 90000 PSI (620 MPA) 5
   MODULUS OF ELASTICITY >= 28000 KSI (193 GPA) 5
   MATERIAL PROPERTIES MUST BE MET AFTER FINAL E-RING MANUFACTURING PROCESS
4. FINISH: NI PLATED IF NOT STAINLESS
5. CRITICAL TO FUNCTION DIMENSION
   CTF DIMENSIONS SHOULD BE VERIFIED AFTER ONE (1) INSTALLATION AND REMOVAL FROM THE GROOVE GEOMETRY SPECIFIED IN DRAWING E86111.
6. E-RING SPECIFICATION JIS B 2805 APPLIES FOR OFF THE SHELF COMPONENT COMPLIANCE.



PARTS LIST

QTY	ITEM NO	PART NUMBER	DESCRIPTION
	TOP	H15294-001	-

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994
DIMENSIONS ARE IN MM
TOLERANCES:
.X ± .5
.XX ± .25
.XXX ± .130

THIRD ANGLE PROJECTION

DESIGNED BY	DATE
H. KOFSTAD	6-19-13
DRAWN BY	DATE
T. BOYD	6-19-13
CHECKED BY	DATE
-	-
-	-
APPROVED BY	DATE
-	-
MATERIAL	FINISH
SEE NOTES	SEE NOTES

DEPARTMENT: PMCI

2200 MISSION COLLEGE BLVD.
P.O. BOX 58119
SANTA CLARA, CA 95052-8119

TITLE: E-RING,HEATSINK,REFERENCE, STANDARD,BROADWELL-DE

SIZE	DRAWING NUMBER	REV
C	H15294	02

SCALE: 18:1 | DO NOT SCALE DRAWING | SHEET 1 OF 1

DWG. NO H15294 SHT. 1 REV 0

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DWG. NO	H26236	SHT. 1	REV

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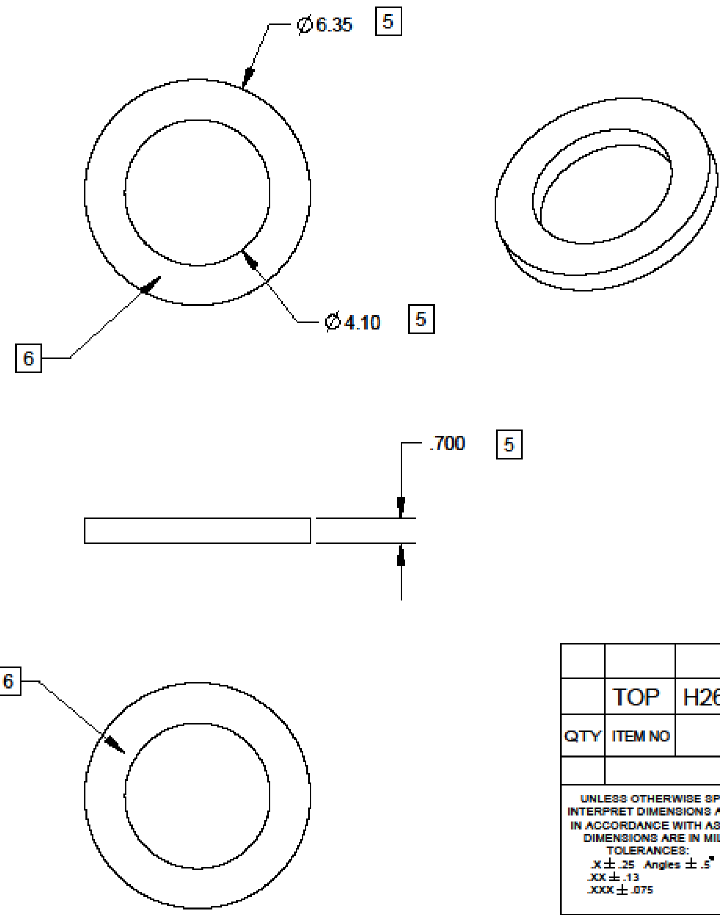
REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPR
-	01	PRELIMINARY RELEASE	10-11-13	-



NOTES; UNLESS OTHERWISE SPECIFIED:

1. REFERENCE DOCUMENTS
   99-0007-001 - INTEL WORKMANSHIP STANDARD - SYSTEMS MANUFACTURING
   18-1201 - INTEL ENVIRONMENTAL PRODUCT CONTENT SPECIFICATION FOR SUPPLIERS & OUTSOURCED MANUFACTURERS (FOUND ON EHS WEBSITE - https://supplier.intel.com/static/EHS/)

2. INTERPRET DIMENSIONS PER ASME Y14.5M-1994.
   FEATURES NOT SPECIFIED ON DRAWING SHALL BE CONTROLLED BY 3D CAD DATABASE. IF PROVIDED, MEASUREMENTS SHOULD REFERENCE DATUM -A- PRIMARY, DATUM -B- SECONDARY, AND -C- TERTIARY.

3. MATERIAL: MAY USE INTEL ENGINEERING APPROVED EQUIVALENT.
   ALL SUBSTANCES IN THIS PART MUST CONFORM TO INTEL ENVIRONMENTAL PRODUCT SPECIFICATION (BS-MTN-0001).
   A) DELRIN ACETAL RESIN. 500P NC010.
   B) PIGMENT: EAGLE 7058 (1%)
   C) COLOR: BLACK.

4. PART MUST COMPLY WITH INTEL WORKMANSHIP STANDARD (99-0007-001).
   PART SHALL BE FREE OF OIL AND DEBRIS.
   FINISH: UNSPECIFIED SURFACES MUST CONFORM WITH CLASS C REQUIREMENTS.

5 CRITICAL TO FUNCTION DIMENSION (CTF).

6 NO GATING ALLOWED ON THESE COMPONENT MATING SURFACES.

QTY	ITEM NO	PART NUMBER	DESCRIPTION
	TOP	H26236-001	

PARTS LIST

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 DIMENSIONS ARE IN MILLIMETERS TOLERANCES: .X ± .25 Angles ± .5° .XX ± .13 .XXX ± .075	DESIGNED BY: -	DATE	DEPARTMENT: - / 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119
	DRAWN BY: H.KOFSTAD	DATE: 10-11-13	TITLE: WASHER,HEATSINK,DELRIN
THIRD ANGLE PROJECTION	CHECKED BY: -	DATE: -	
	APPROVED BY	DATE	SIZE: B / DRAWING NUMBER: H26236 / REV: 01
	MATERIAL: SEE NOTES	FINISH: SEE NOTES	SCALE: 8.000 / DO NOT SCALE DRAWING / SHEET 1 OF 1

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APPENDIX C – LOW PROFILE STORAGE HEATSINK MECHANICAL DRAWINGS

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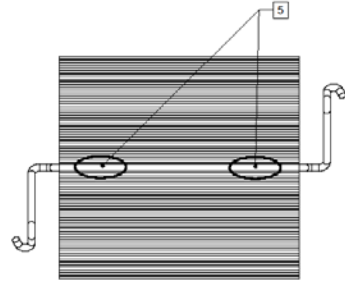
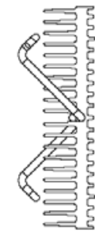
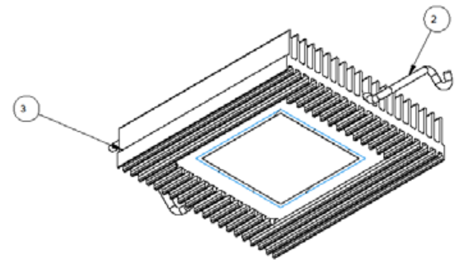
DWG. NO	SHT.	REV
H15472	1	A

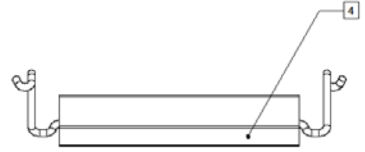
REVISION HISTORY

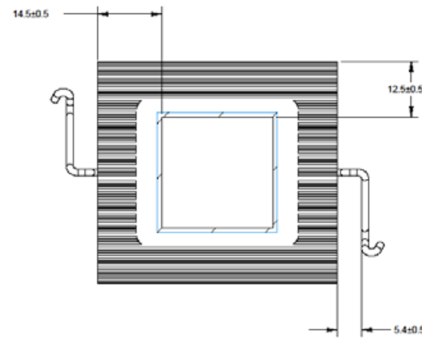
ZONE	REV	DESCRIPTION	DATE	APPR
-	A	PRELIMINARY	6-20-13	TAB
	B	CHANGE DRAWING DESCRIPTION	6-25-13	HRK
	03	CHANGE FIN HEIGHT; WAS:3.05MM IS:7.35MM	8-29-13	HRK











NOTES:

1. THIS DRAWING TO BE USED IN CORRELATION WITH SUPPLIED 3D DATABASE FILE. ALL DIMENSIONS AND TOLERANCES ON THIS DRAWING TAKE PRECEDENCE OVER SUPPLIED FILE.
2. ALL DIMENSION AND TOLERANCES PER ANSI Y14.5-1994.
3. REMOVE ALL BURRS, SHARP EDGES, GREASES, AND/OR SOLVENTS AFTER FINAL ASSEMBLY.

[4] MARK ASSEMBLY PART APPROXIMATELY WHERE SHOWN PER INTEL MARKING STANDARD G14577 WITH ADDITIONAL INFORMATION:
A) ASSEMBLY VENDOR ID
B) DATE CODE

[5] CLIP TO LAY IN CENTER GROOVE. MATERIAL ON EDGES OF CENTER GROOVE TO BE SWAGED APPROX. IN THE AREAS SHOWN TO RETAIN CLIP IN GROOVE. CLIP MUST ROTATE FREELY 360° AFTER SWAGING PROCESS.

QTY	ITEM NO	PART NUMBER	DESCRIPTION
1	3	H15473-001	BVC LOW PROFILE HS EXTRUSION
1	2	H15475-001	BVC HS CLIP
1	1	BVC-R-TIM	25X25 HONEYWELL PCM45-F
	TOP	H15472-001	HS ASSY, BEVERLY COVE, ZWIRE

PARTS LIST

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 DIMENSIONS ARE IN MM TOLERANCES: PER DRAWING DIMENSIONS

THIRD ANGLE PROJECTION

DESIGNED BY	DATE
H. KOFSTAD	6-20-13
DRAWN BY	DATE
T, BOYD	6-20-13
CHECKED BY	DATE
-	-
APPROVED BY	DATE
-	-
MATERIAL	FINISH
SEE NOTES	SEE NOTES

DEPARTMENT: PMCI

intel 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119

TITLE: HEATSINK ASSY.REFERENCE,NOMINAL

SIZE	DRAWING NUMBER	REV
D	H15472	03

SCALE: 2:1 | DO NOT SCALE DRAWING | SHEET 1 OF 1

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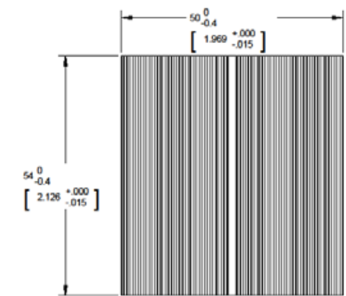
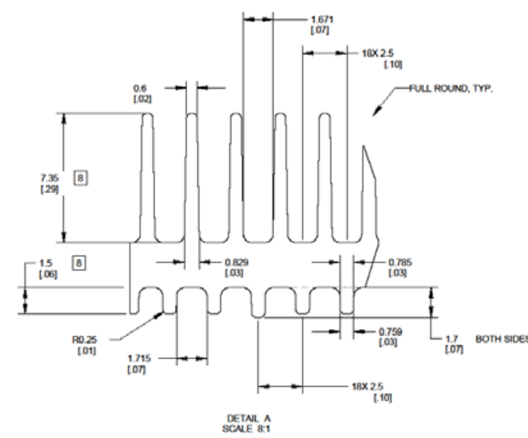
DWG. NO	SHT.	REV
H15473	1	A

REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPR
-	01	PRELIMINARY	6-20-13	TAB
	02	ADD DIMENSION 1.70 (BOTH SIDES) TO DETAIL-A ADD RADIUS TO CUT ON BOTTOM FINS FOR MANUFACTURER	8-20-13	HRK
	03	CHANGE TOP FIN HEIGHT WAS: 3.05MM IS: 7.35MM	8-28-13	HRK

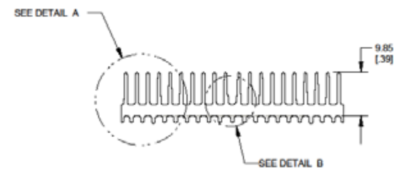


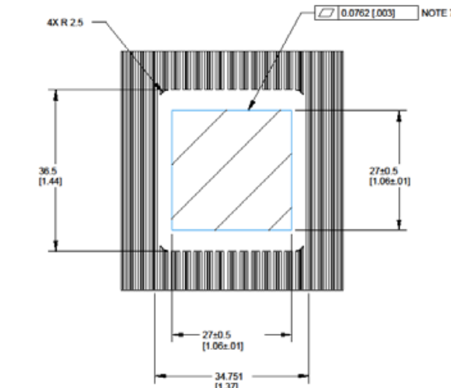


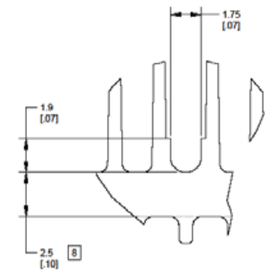
DETAIL A
SCALE 8:1

NOTES:

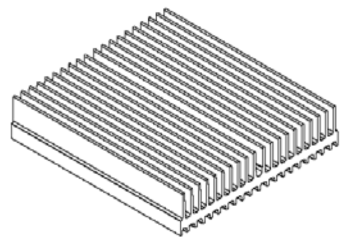
1. THIS DRAWING TO BE USED IN CONJUNCTION WITH SUPPLIED 3D DATABASE FILE. ALL DIMENSIONS AND TOLERANCES ON THIS DRAWING TAKE PRECEDENCE OVER SUPPLIED FILE.
2. PRIMARY DIMENSIONS STATED IN MILLIMETERS, [BRACKETED] DIMENSIONS STATED IN INCHES. CRITICAL TO FUNCTION DIMENSION.
3. ALL DIMENSION AND TOLERANCES PER ANSI Y14.5-1994.
4. HEAT SINK VOLUMETRIC. ALL HEAT SINK GEOMETRY MUST FIT WITHIN THE SPACE DEFINED BY THIS DRAWING..
6. REMOVE ALL BURRS, SHARP EDGES, GREASES, AND/OR SOLVENTS AFTER MACHINING AND FIN ASSEMBLY.
7. LOCAL FLATNESS ZONE .076 MM [0.003"] CENTERED ON HEAT SINK BASE.
[8] CRITICAL TO FUNCTION DIMENSION.
9. MATERIAL: 6063 -T5 SERIES ALUMINUM OR EQUIVALENT MINIMUM K = 216 W/M-K







DETAIL B
SCALE 8:1



QTY	ITEM NO	PART NUMBER	DESCRIPTION
	TOP	H15473-001	-

PARTS LIST

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 DIMENSIONS ARE IN MM

THIRD ANGLE PROJECTION

DESIGNED BY	DATE
H. KOFSTAD	6-20-13
DRAWN BY	DATE
T. BOYD	6-20-13
CHECKED BY	DATE
-	-
APPROVED BY	DATE
-	-
MATERIAL	FINISH
SEE NOTES	SEE NOTES

DEPARTMENT: PMCI

2200 MISSION COLLEGE BLVD.
P.O. BOX 58119
SANTA CLARA, CA 95052-8119

TITLE: HEATSINK,EXTRUSION REFERENCE, LOW PROFILE

SIZE	DRAWING NUMBER	REV
D	H15473	03

SCALE: 2:1 | DO NOT SCALE DRAWING | SHEET 1 OF 1

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DWG. NO H15475 | SHT. 1 | REV A

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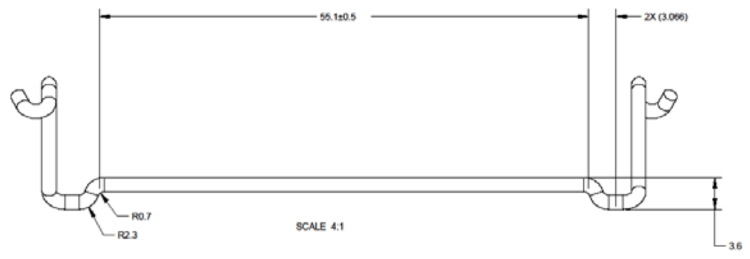
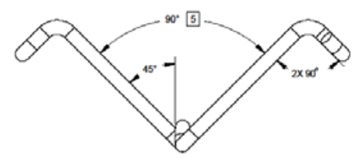
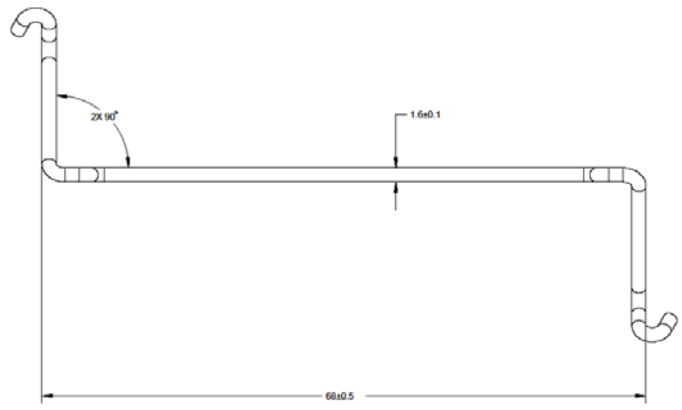
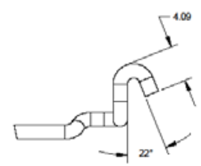
REVISION HISTORY

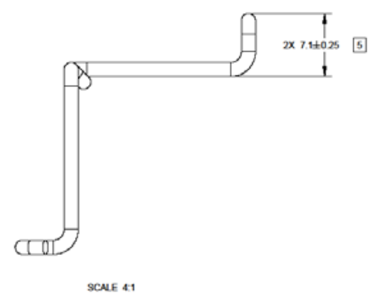
ZONE	REV	DESCRIPTION	DATE	APPR
-	01	PRELIMINARY	6-20-13	TAB
	02	CHANGE TOLERANCES ON 55.1 AND 7.1 DIMENSIONS	8-20-13	HRK
	03	CHANGE OVERALL DIMENSION PER DFM	8-27-13	HRK











NOTES:

1. THIS DRAWING TO BE USED IN CORRELATION WITH SUPPLIED 3D DATABASE FILE. ALL DIMENSIONS AND TOLERANCES ON THIS DRAWING TAKE PRECEDENCE OVER SUPPLIED FILE AND ARE APPLICABLE AT PART FREE, UNCONSTRAINED STATE UNLESS INDICATED OTHERWISE.
2. TOLERANCES ON DIMENSIONED AND UNDIMENSIONED FEATURES UNLESS OTHERWISE SPECIFIED:
   DIMENSIONS ARE IN MILLIMETERS.
   TOLERANCES: LINEAR ± 0.25
   ANGLES: ± 3°
3. MATERIAL:
   A) TYPE: ASTM A228 MUSIC WIRE Ø1.6 ± 0.1MM
      PLATING: ELECTRO-LESS NICKEL OR EQUIVALENT UPON INTEL APPROVAL.
   B) CRITICAL MECHANICAL MATERIAL PROPERTIES FOR EQUIVALENT MATERIAL SELECTION:
      TENSILE YIELD STRENGTH (ASTM D638) > 965 MPa
      FLEXURAL MODULUS (ASTM D638) 210 GPa ±10%
4. REF: REFERENCE DIMENSION.
5. [5] CRITICAL TO FUNCTION DIMENSION
6. MARK WITH INTEL P/N AND REVISION PER INTEL MARKING STANDARD 164997; PER SEC 3.8 (POLYETHYLENE BAG)
7. REMOVE ALL SHARP EDGES AND BURRS.
8. ALL DIMENSIONS SHOWN SHALL BE MEASURED FOR FAI
9. ALL SECONDARY UNIT DIMENSIONS ARE FOR REFERENCE ONLY.

QTY	ITEM NO	PART NUMBER	DESCRIPTION
	TOP	H15475-001	CLIP, HS, BVC

PARTS LIST

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 DIMENSIONS ARE IN INCHES TOLERANCES: AS STATED IN DIMENSIONS AND NOTES

THIRD ANGLE PROJECTION

DESIGNED BY: H. KOFSTAD	DATE: 6-20-13	DEPARTMENT: PMCI	2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119
DRAWN BY: T. BOYD	DATE: 6-20-13	TITLE: HEATSINK,Z-CLIP.REFERENCE. LOW PROFILE,[illegible]	
CHECKED BY: -	DATE: -		
APPROVED BY: -	DATE: -	SIZE: D	DRAWING NUMBER: H15475 — REV: 03
MATERIAL: SEE NOTES	FINISH: SEE NOTES	SCALE: 2:1	DO NOT SCALE DRAWING — SHEET 1 OF 1

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APPENDIX D – SBB STANDARD STORAGE HEATSINK MECHANICAL DRAWINGS

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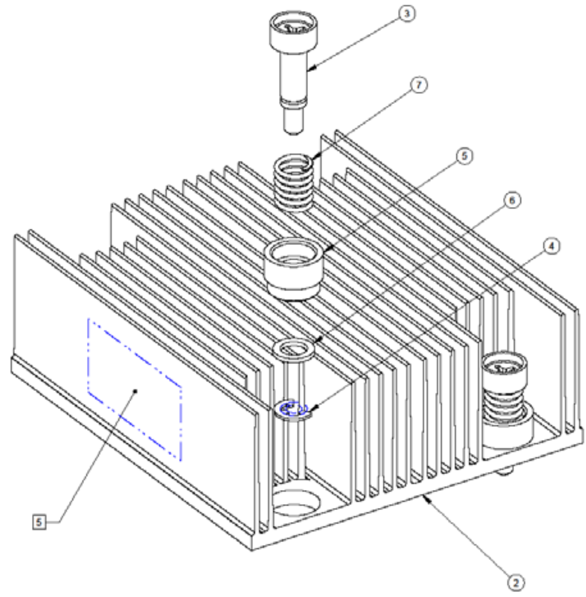
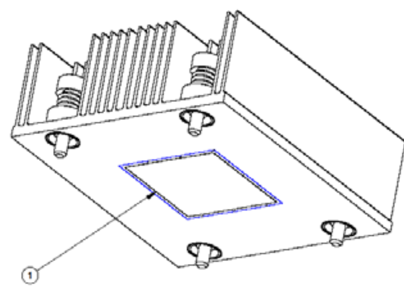
DWG. NO H22688 | SHT. 1 | REV 0

REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPR
	03	CORRECT REFERENCE BALLOONS; MODIFY TORQUE SPEC.;SPECIFY NOTE 5	11/05/13	
	02	ADDED DELRINE WASHER; H26236	10/17/13	
-	01	PRELIMINARY	09/09/13	-



SCALE 3:1



NOTES:

1. THIS DRAWING TO BE USED IN CORRELATION WITH SUPPLIED 3D DATABASE FILE. ALL DIMENSIONS AND TOLERANCES ON THIS DRAWING TAKE PRECEDENCE OVER SUPPLIED FILE.
2. PRIMARY DIMENSIONS STATED IN MILLIMETERS, [BRACKETED] DIMENSIONS STATED IN INCHES. CRITICAL TO FUNCTION DIMENSION.
3. ALL DIMENSION AND TOLERANCES PER ANSI Y14.5-1994.
4. REMOVE ALL BURRS, SHARP EDGES, GREASES, AND/OR SOLVENTS AFTER FINAL ASSEMBLY.

[5] PART NUMBER AND TORQUE SPEC MARK. PLACE PART NUMBER AND TORQUE SPEC IN ALLOWABLE AREA, EITHER SIDE OF PART WHERE SHOWN. BELOW PART NUMBER CALLOUT, PLACE THE FOLLOWING TEXT:

"RECOMMENDED SCREW TORQUE: 6 IN-LBF MAXIMUM"

THE MARK CAN BE AN INK MARK, LASER MARK, PUNCH MARK OR ANY OTHER PERMANENT MARK THAT IS READABLE AT 1.0X MAGNIFICATION.

[6] PRESS FIT BOTTOM OF CUP LIP FLUSH TO TOP SURFACE OF HEAT SINK.

[7] ITEM 5 TO BE PRESSED INTO ITEM 3 (4 PLC),MINIMUM PUSH OUT FORCE = 30 LBF PER CUP, SEE SHEET 2.

[8] CRITICAL TO FUNCTION DIMENSION.

[9] INSTALL E-RING SO BURR/PUNCH DIRECTION/SHARP EDGE IS AWAY FROM BASE CUP SURFACE.

[10] ALLOWABLE PROTRUSION OF CUP FROM BASE.

PARTS LIST

QTY	ITEM NO	PART NUMBER	DESCRIPTION
4	7	H15293-2	BVC SPRING, HEATSINK
4	6	H26236-001	WASHER, HEATSINK, DELRIN
4	5	H15292-001	BVC SPRING CUP INSERT
4	4	H15294-001	BVC HS E-RING
4	3	H15360-001	BVC HEATSINK SHOULDER SCREW
1	2	H22689-001	BDE HEATSINK EXTRUSION
1	1	BVC-R-TIM	25X25 HONEYWELL PCM45-F
	TOP	H22688-001	TOP ASSEMBLY

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994. DIMENSIONS ARE IN INCHES.

THIRD ANGLE PROJECTION

DESIGNED BY	DATE
P. ANDERSON	09/09/13
DRAWN BY	DATE
P. ANDERSON	09/09/13
CHECKED BY	DATE
-	-
APPROVED BY	DATE
-	-
MATERIAL SEE NOTES	FINISH SEE NOTES

DEPARTMENT: PMCI

2200 MISSION COLLEGE BLVD.
P.O. BOX 58119
SANTA CLARA, CA 95052-8119

TITLE: BDX-DE REFERENCE STORAGE HEATSINK

SIZE: D | DRAWING NUMBER: H22688 | REV: 03

SCALE: 2:1 | DO NOT SCALE DRAWING | SHEET 1 OF 2

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DWG. NO	SHT.	REV
H22689	1	0

REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPR
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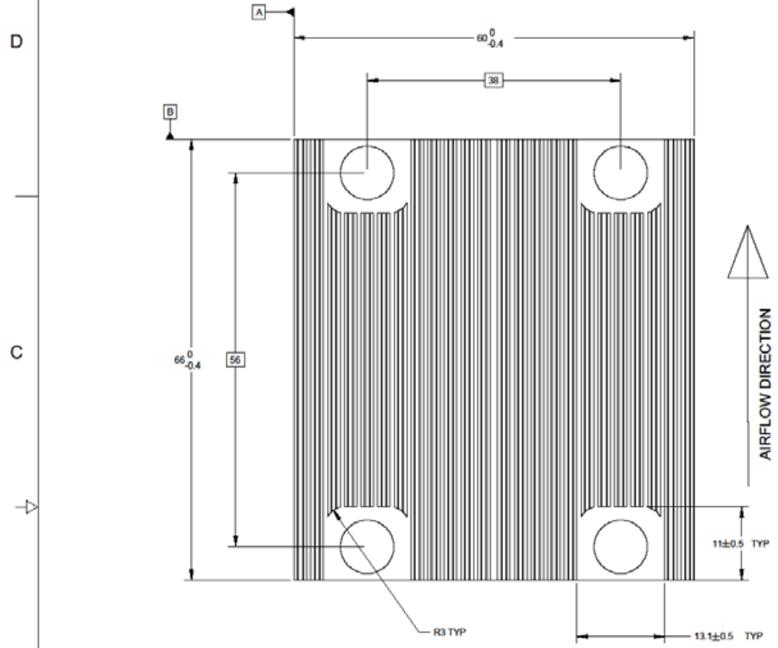
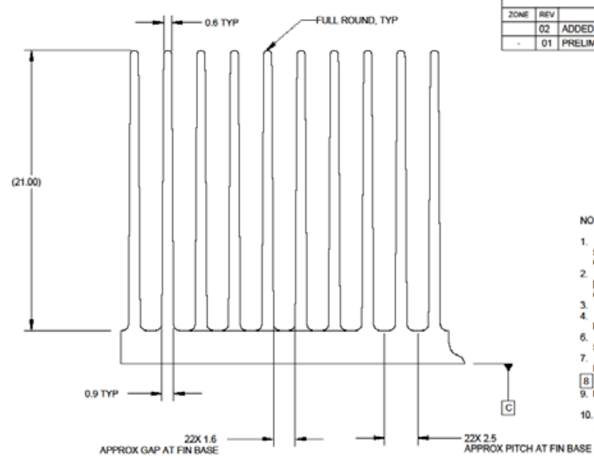
-	01	PRELIMINARY	09/10/13	-

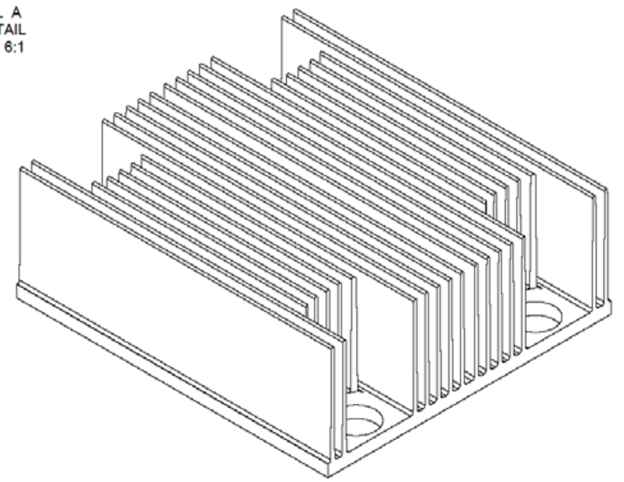


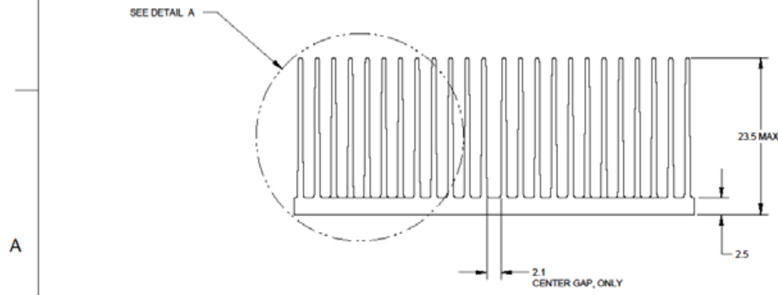


DETAIL A
FIN DETAIL
SCALE 6:1

NOTES:

1. THIS DRAWING TO BE USED IN CONJUNCTION WITH SUPPLIED 3D DATABASE FILE. ALL DIMENSIONS AND TOLERANCES ON THIS DRAWING TAKE PRECEDENCE OVER SUPPLIED FILE.
2. PRIMARY DIMENSIONS STATED IN MILLIMETERS, [BRACKETED] DIMENSIONS STATED IN INCHES. CRITICAL TO FUNCTION DIMENSION.
3. ALL DIMENSION AND TOLERANCES PER ANSI Y14.5-1994.
4. HEAT SINK VOLUMETRIC. ALL HEAT SINK GEOMETRY MUST FIT WITHIN THE SPACE DEFINED BY THIS DRAWING.
6. REMOVE ALL BURRS, SHARP EDGES, GREASES, AND/OR SOLVENTS AFTER MACHINING AND FIN ASSEMBLY.
7. LOCAL FLATNESS ZONE .076 MM [0.003"] CENTERED ON HEAT SINK BASE.
8 CRITICAL TO FUNCTION DIMENSION.
9. MATERIAL: 6063 -T5 SERIES ALUMINUM OR EQUIVALENT MINIMUM K = 216 W/M-K
10. FINISH: BLACK ANODIZE PER MIL STD 8625, TYPE II, CLASS II.





QTY	ITEM NO	PART NUMBER	DESCRIPTION
	TOP	H22689-001	BDE HEATSINK EXTRUSION

PARTS LIST

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994 DIMENSIONS ARE IN INCHES TOLERANCES: X ± 0.1 Angles ± 0.5° .XX ± 0.01 .XXX ± 0.001

THIRD ANGLE PROJECTION

DESIGNED BY	DATE
P. ANDERSON	09/10/13
DRAWN BY	DATE
P. ANDERSON	09/10/13
CHECKED BY	DATE
-	-
APPROVED BY	DATE
-	-
MATERIAL	FINISH
SEE NOTES	SEE NOTES

DEPARTMENT: PMCI

2200 MISSION COLLEGE BLVD.
P.O. BOX 58119
SANTA CLARA, CA 95052-8119

TITLE: HS REFERENCE DESIGN, STORAGE,

SIZE	DRAWING NUMBER	REV
D	H22689	02

SCALE: 3:1 | DO NOT SCALE DRAWING | SHEET 1 OF 2

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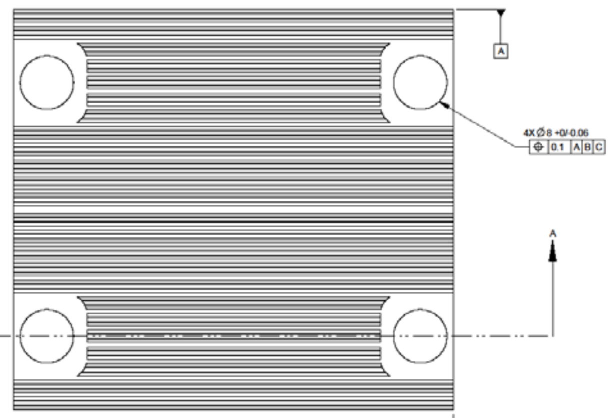

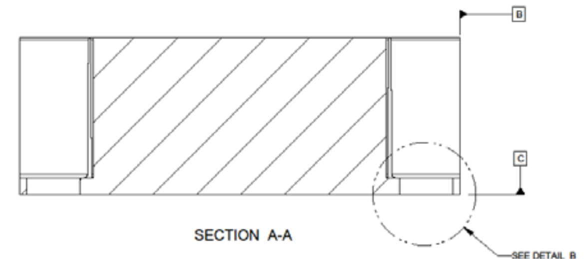

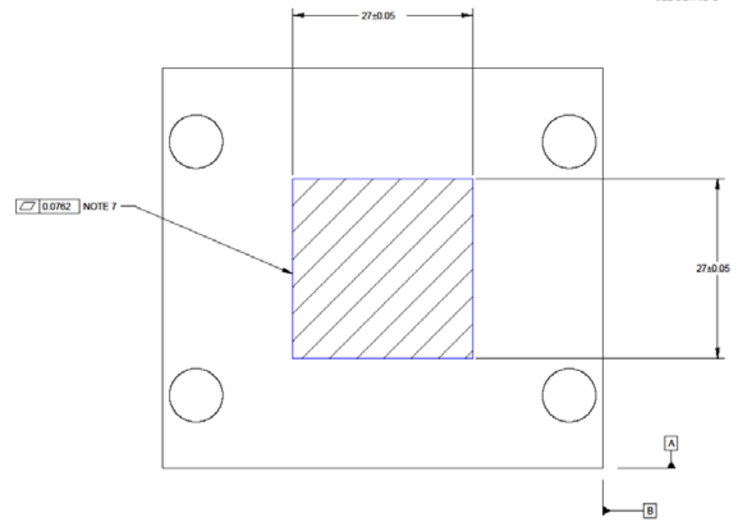

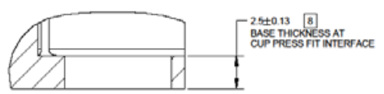

DETAIL B
SCALE 6:1

DEPARTMENT		SIZE	DRAWING NUMBER	REV
PMCI	intel 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119	D	H22689	02
		SCALE: 3:1	DO NOT SCALE DRAWING	SHEET 2 OF 2

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APPENDIX E – ATCA* REFERENCE HEATSINK MECHANICAL DRAWINGS

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Reference Number: 332055-002

DWG. NO	SHT.	REV
BDW_DE_ATCA_ASSEMBLY_REV1	1	

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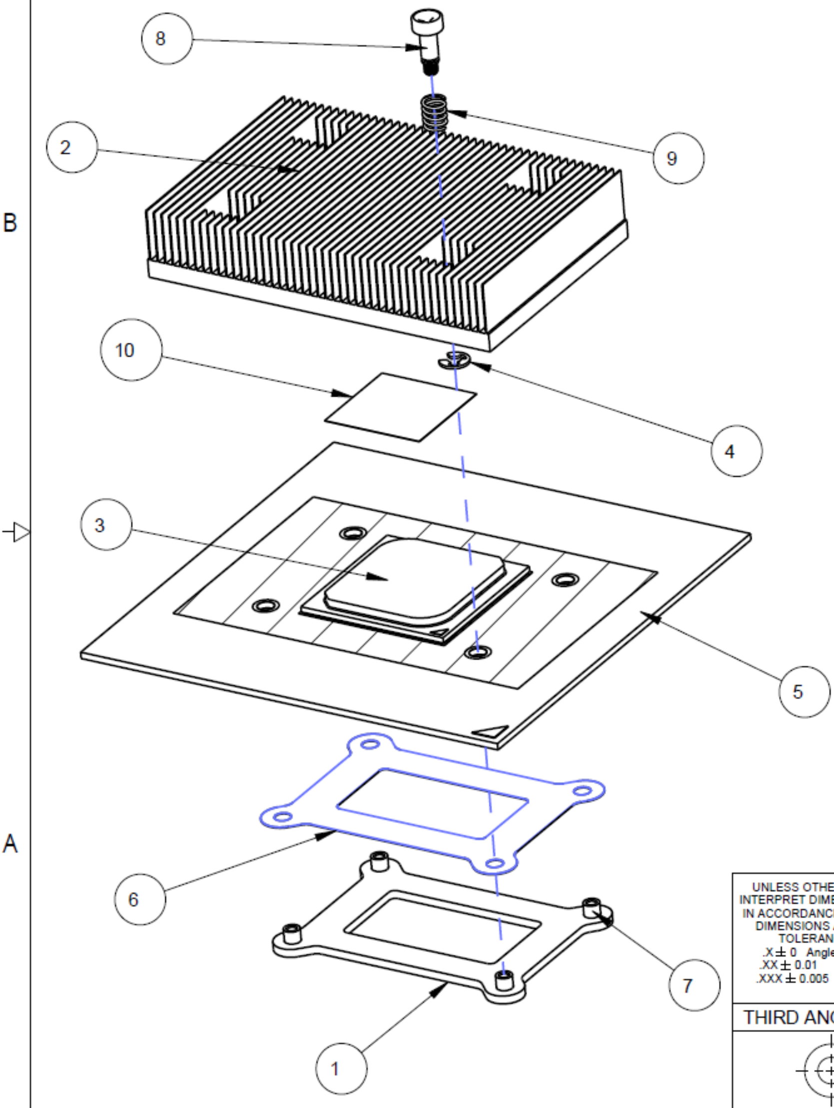
REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPR
-	-	-	-	-

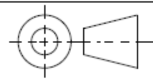


QTY	ITEM NO	PART NUMBER	DESCRIPTION
1	10	THERMAL_INTERFACE_MATERIAL	25X25 HONEYWELL PCM45-F
4	9	SPRING	
4	8	SCREW	
4	7	PEM	
1	6	INSULATOR	
1	5	GENERIC_BOARD	REFERENCE ONLY
4	4	E-RING	
1	3	BDW_DE_PRELIMINARY_REV0PT5	
1	2	BDW_DE_ATCA_REFERENCE	
1	1	BACKPLATE	
	TOP	BDW_DE_ATCA_ASSEMBLY_REV1	

PARTS LIST

UNLESS OTHERWISE SPECIFIED
INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994
DIMENSIONS ARE IN INCHES
TOLERANCES:
.X ± 0 Angles ± 0.5°
.XX ± 0.01
.XXX ± 0.005

THIRD ANGLE PROJECTION



DESIGNED BY	DATE
-	
DRAWN BY	DATE
CHECKED BY	DATE
-	-
APPROVED BY	DATE
MATERIAL	FINISH
SEE NOTES	SEE NOTES

DEPARTMENT -

intel 2200 MISSION COLLEGE BLVD.
P.O. BOX 58119
SANTA CLARA, CA 95052-8119

TITLE

SIZE	DRAWING NUMBER	REV
B	ATCA_ASSEMBLY_REV	1
SCALE: 1	DO NOT SCALE DRAWING	SHEET 1 OF 1

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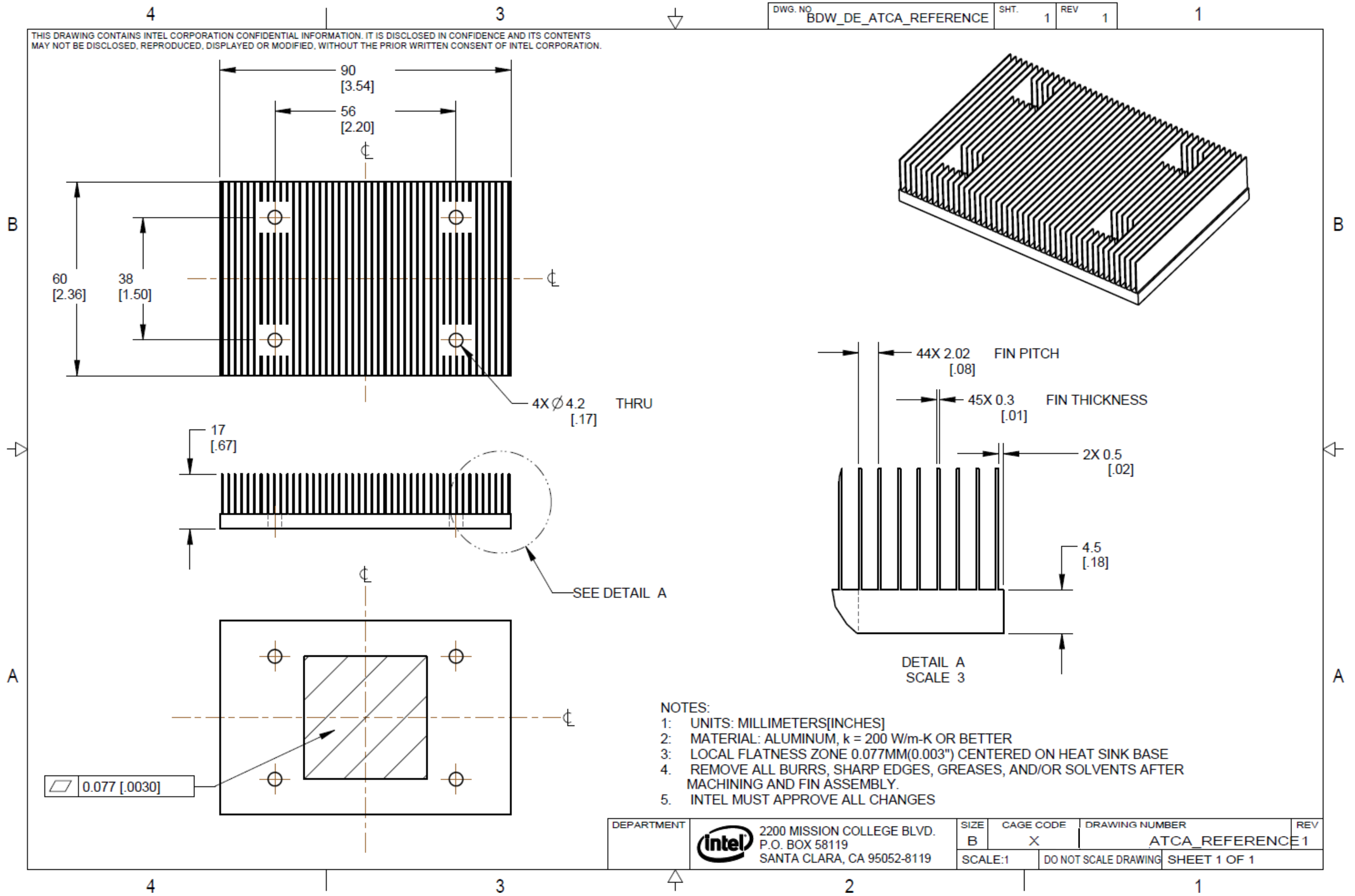

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DWG. NO	BDW_DE_REF_KOZ	SHT. 1	REV 1

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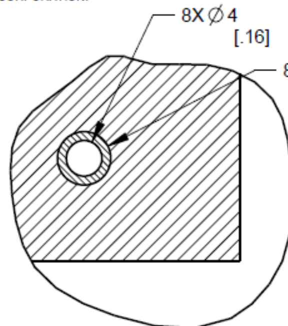
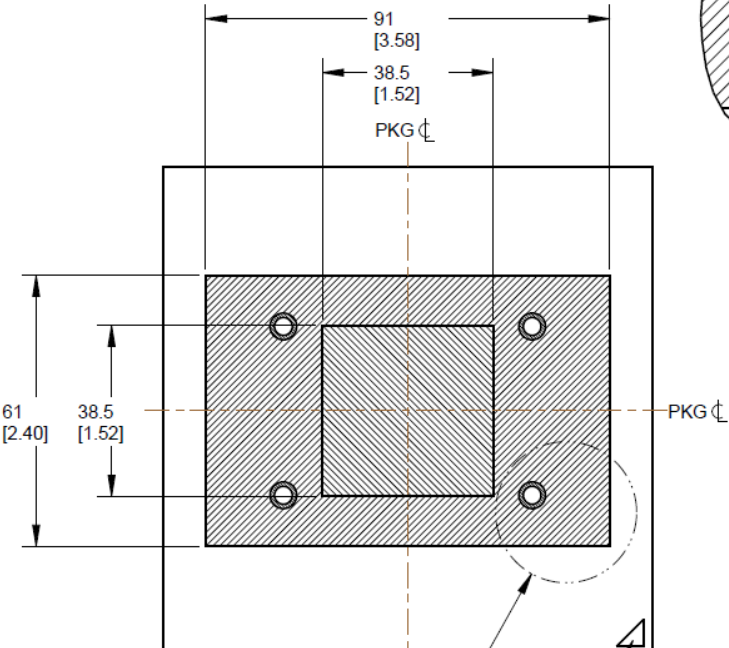
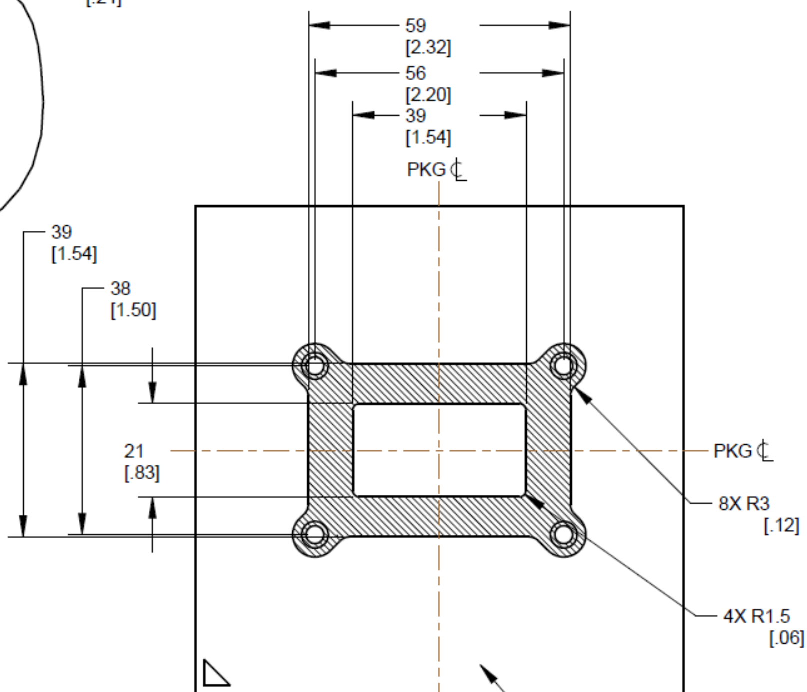


DETAIL A
SCALE 2





AIRFLOW DIRECTION

(hatch)	2.28 MM MAX COMPONENT HIGH UNDER THERMAL SOLUTION
(hatch)	0.0 MM MAX COMPONENT HEIGHT, NO COMPONENT PLACEMENT

NOTES:
1) UNITS ARE IN MM [IN]
2) REFERENCE THERMAL SOLUTION SHALL BE CENTERED ABOUT PACKAGE CENTER
3) MOUTING HOLE PLATING PRESENT ON PRIMARY AND SECONDARY SIDES

DEPARTMENT		SIZE	CAGE CODE	DRAWING NUMBER	REV
-	intel 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119	B	X	_ _REF_KOZ	1
		SCALE:1	DO NOT SCALE DRAWING	SHEET 1 OF 1	

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APPENDIX F – CPCI* REFERENCE HEATSINK MECHANICAL DRAWINGS

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DWG. NO BDW_DE_CPCI_REF_ASSEMBLY_R1 | SHT. 1 | REV

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REVISION HISTORY

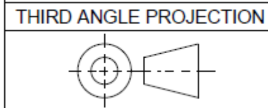
ZONE	REV	DESCRIPTION	DATE	APPR
-	-	-	-	-

QTY	ITEM NO	PART NUMBER	DESCRIPTION
1	10	THERMAL_INTERFACE_MATERIAL	25X25 HONEYWELL PCM45-F
4	9	SPRING	
4	8	SCREW	
4	7	PEM	
1	6	INSULATOR	
1	5	GENERIC_BOARD	REFERENCE ONLY
4	4	E-RING	
1	3	BDW_DE_PRELIMINARY_REV0PT5	
1	2	BDW_DE_CPCI_REFERENCE	
1	1	BACKPLATE	
	TOP	BDW_DE_CPCI_ASSEMBLY_REV1	

PARTS LIST

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994
DIMENSIONS ARE IN INCHES
TOLERANCES:
.X ± 0 Angles ± 0.5°
.XX ± 0.01
.XXX ± 0.005

THIRD ANGLE PROJECTION



DESIGNED BY	DATE
-	
DRAWN BY	DATE
CHECKED BY	DATE
-	-
APPROVED BY	DATE
MATERIAL	FINISH
SEE NOTES	SEE NOTES

DEPARTMENT -

2200 MISSION COLLEGE BLVD.
P.O. BOX 58119
SANTA CLARA, CA 95052-8119

TITLE

SIZE | DRAWING NUMBER CPCI_REF_ASSEMBLY_R1 | REV

SCALE: 1 | DO NOT SCALE DRAWING | SHEET 1 OF 1

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4 3 DWG. NO BDW_DE_CPCI_REFERENCE SHT. 1 REV 1 1

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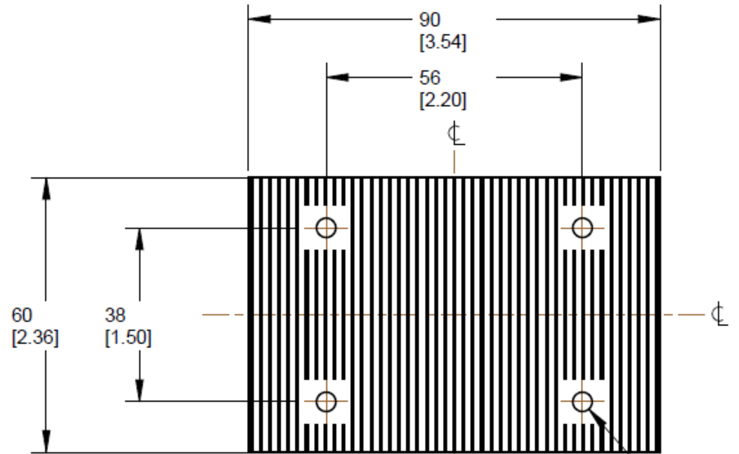

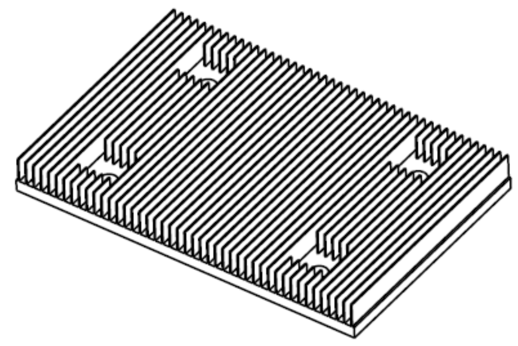

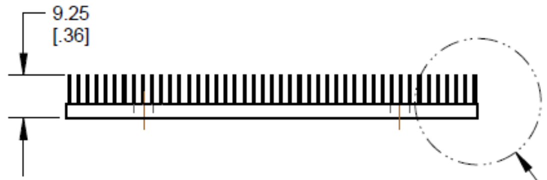

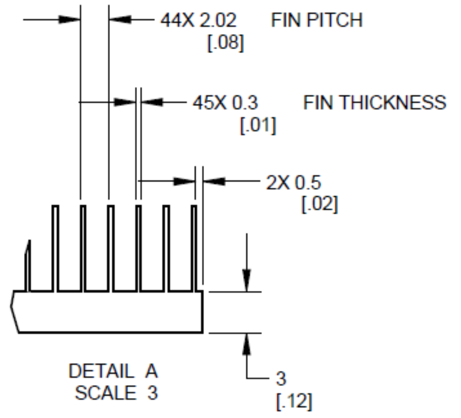

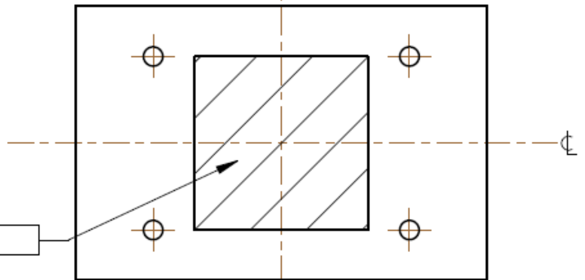

NOTES:

1: UNITS: MILLIMETERS[INCHES]
2: MATERIAL: ALUMINUM, k = 200 W/m-K OR BETTER
3: LOCAL FLATNESS ZONE 0.077MM(0.003") CENTERED ON HEAT SINK BASE
4. REMOVE ALL BURRS, SHARP EDGES, GREASES, AND/OR SOLVENTS AFTER MACHINING AND FIN ASSEMBLY.
5. INTEL MUST APPROVE ALL CHANGES

DEPARTMENT	intel 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119	SIZE	CAGE CODE	DRAWING NUMBER	REV
		B	X	CPCI_REFERENCE	1
		SCALE:1	DO NOT SCALE DRAWING	SHEET 1 OF 1	

4 3 2 1

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DWG. NO	BDW_DE_REF_KOZ	SHT. 1	REV 1

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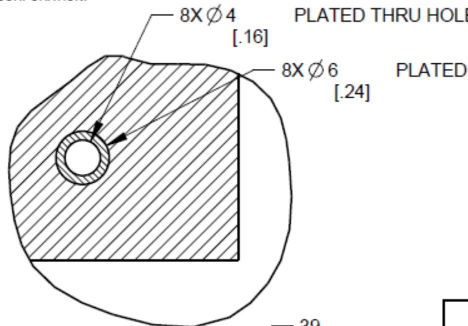

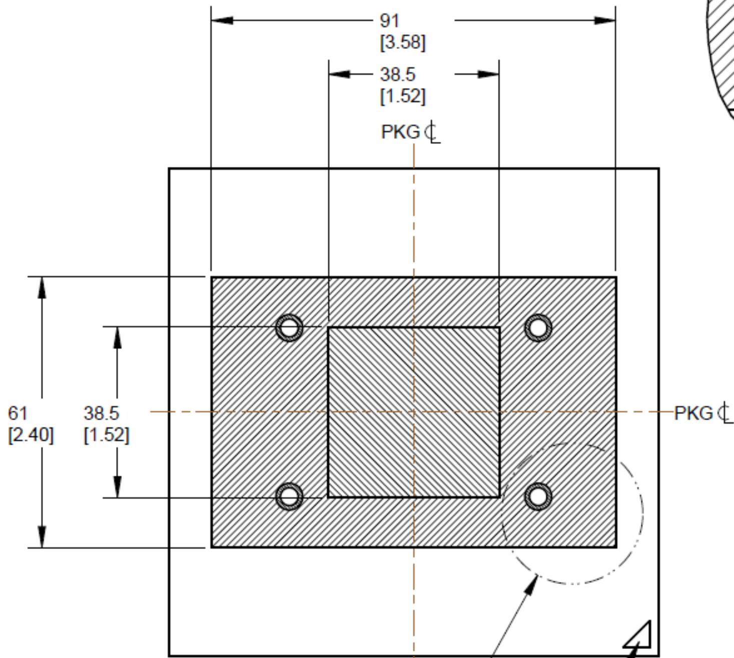

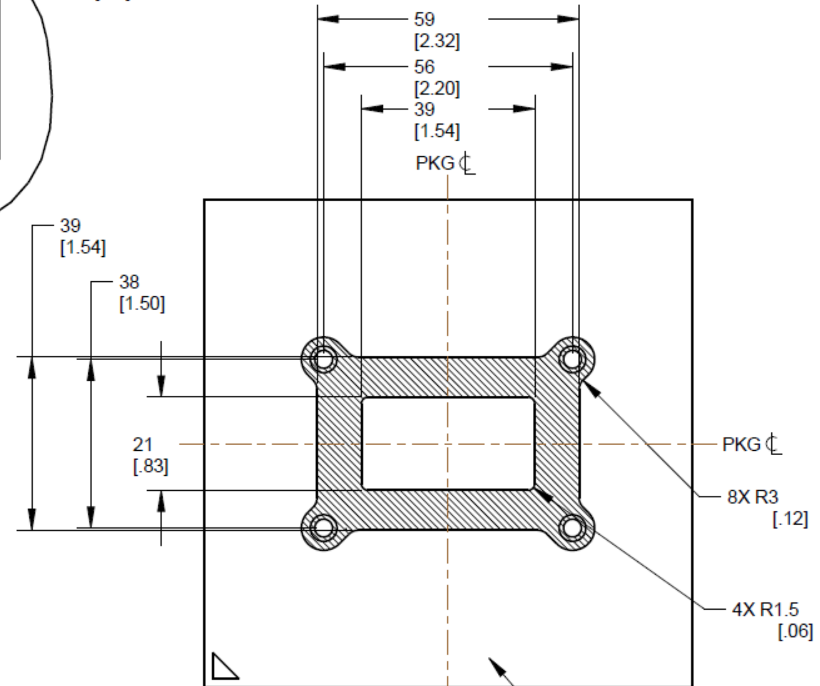

AIRFLOW DIRECTION

(hatch)	2.28 MM MAX COMPONENT HIGH UNDER THERMAL SOLUTION
(hatch)	0.0 MM MAX COMPONENT HEIGHT, NO COMPONENT PLACEMENT

NOTES:
1) UNITS ARE IN MM [IN]
2) REFERENCE THERMAL SOLUTION SHALL BE CENTERED ABOUT PACKAGE CENTER
3) MOUTING HOLE PLATING PRESENT ON PRIMARY AND SECONDARY SIDES

DEPARTMENT		SIZE	CAGE CODE	DRAWING NUMBER	REV
-	intel 2200 MISSION COLLEGE BLVD. P.O. BOX 58119 SANTA CLARA, CA 95052-8119	B	X	EF_KOZ	1
		SCALE:1	DO NOT SCALE DRAWING	SHEET 1 OF 1	

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APPENDIX G – PCIE HBA REFERENCE HEATSINK MECHANICAL DRAWINGS

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DWG. NO	H54534	SHT.	1	REV	0

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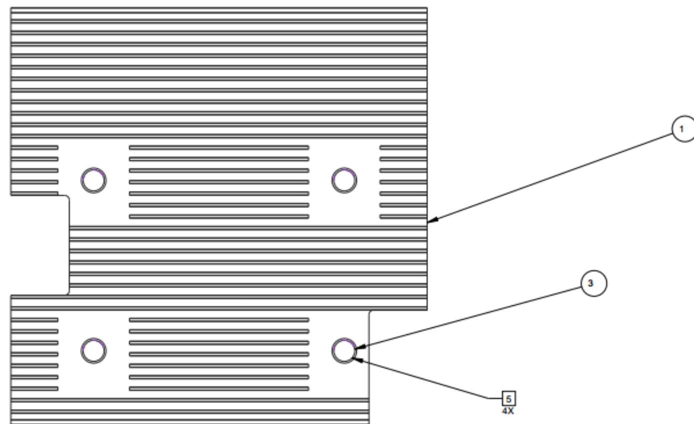
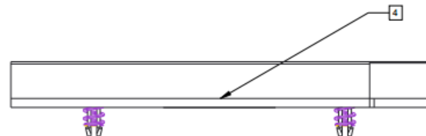
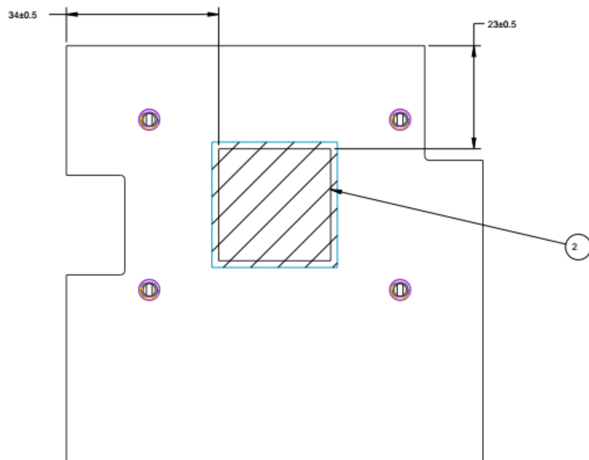
REVISION HISTORY

ZONE	REV	DESCRIPTION	DATE	APPR
-	-	-	-	-



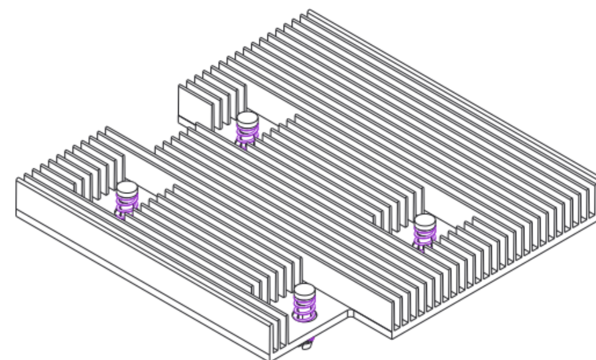




NOTES:
1. THIS DRAWING TO BE USED IN CORRELATION WITH SUPPLIED 3D DATABASE FILE. ALL DIMENSIONS AND TOLERANCES ON THIS DRAWING TAKE PRECEDENCE OVER SUPPLIED FILE.
2. ALL DIMENSION AND TOLERANCES PER ANSI Y14.5-1994.
3. REMOVE ALL BURRS, SHARP EDGES, GREASES, AND/OR SOLVENTS AFTER FINAL ASSEMBLY.

[4] MARK ASSEMBLY PART APPROXIMATELY WHERE SHOWN PER INTEL MARKING STANDARD G14577 WITH ADDITIONAL INFORMATION:
A) ASSEMBLY VENDOR ID
B) DATE CODE

[5] INSTALL ITW SPRING FASTENER, ITEM #3, INTO PLACE



QTY	ITEM NO	PART NUMBER	DESCRIPTION
4	3	H42554-001	ITW SPRING FASTENER, 84FT02-129
1	2	H38072-TIM	HONEYWELL PCM45-F, 25MM X 25MM
1	1	H54533-001	DENVERTON HEATSINK EXTRUSION
	TOP	H54534-001	-

PARTS LIST

UNLESS OTHERWISE SPECIFIED INTERPRET DIMENSIONS AND TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994
DIMENSIONS ARE IN INCHES
TOLERANCES:
.X ± 0.0 Angles ± 0.5°
.XX ± 0.01
.XXX ± 0.005

THIRD ANGLE PROJECTION

DESIGNED BY	DATE
PHA	072314
DRAWN BY	DATE
PHA	072314
CHECKED BY	DATE
-	-
APPROVED BY	DATE
-	-
MATERIAL	FINISH
SEE NOTES	SEE NOTES

DEPARTMENT: PMCI

2200 MISSION COLLEGE BLVD.
P.O. BOX 58119
SANTA CLARA, CA 95052-8119

TITLE: HEATSINK ASSEMBLY, TLAQUEPAQUE, DENVERTON

SIZE	DRAWING NUMBER	REV
D	H54534	01

SCALE: 2:1 | DO NOT SCALE DRAWING | SHEET 1 OF 1

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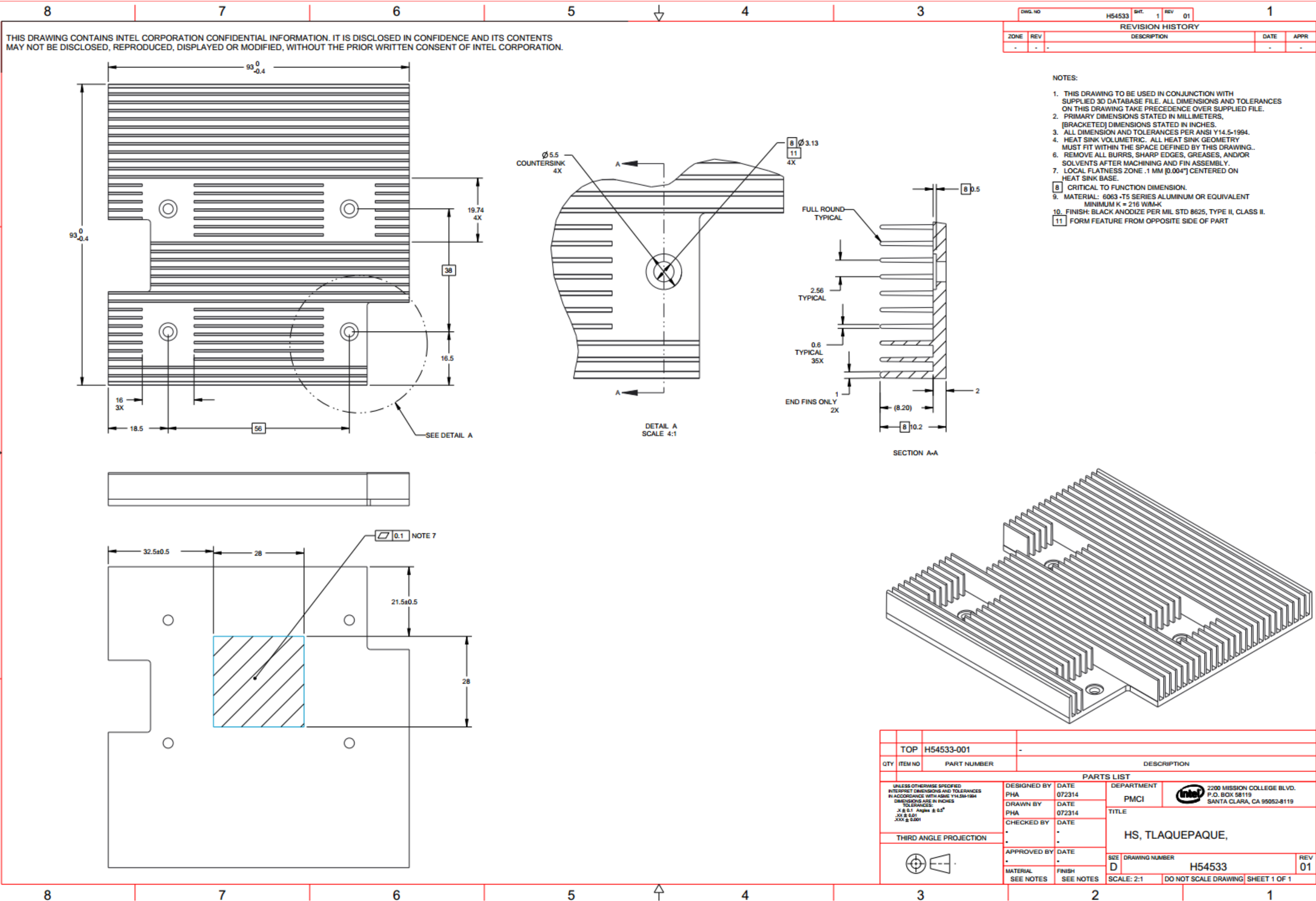

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APPENDIX H – HEATSINK SUPPLIERS

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Heatsink Suppliers

Component	Intel Part Number	Supplier PN	Supplier	Supplier Contact Info	Notes
Intel® Xeon® Processor D-1500 Product Family Heatsink Assy (Spring Screw Retention Type)	H15289-002	00Z94630201	Chaun-Choung Technology Corp (CCI)	Contact: Monica Chih, monica_chih@ccic.com.tw, 886-2-29952666 ext.1131	1,2,3,4,5
Intel® Xeon® Processor D-1500 Product Family Backplate Assy	H15366-002	00Z94600201			
Intel® Xeon® Processor D-1500 Product Family Low Profile Heatsink (Z Clip Type Retention)	H15472-001	00Z94590101			
Intel® Xeon® Processor D-1500 Product Family Heatsink Assy Storage (Spring Screw Retention Type)	H22688-001	00Z96050101			
ATCA* Heatsink Assy	H69906-01	TBD	Chaun-Choung Technology Corp (CCI) TBD	Contact: Tina Huang, tina_huang@ccic.com.tw, 886-2-29952666 ext.1788	
CPCI* Heatsink Assy	H69905-01	TBD			

Note:
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3. Supplier information provided in the table was deemed accurate when this document was released.
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