GLAST LAT SYSTEM SPECIFICATION	Document # **LAT-TD-00828-01**	Date 10 July 2002
	Author(s) Eduardo do Couto e Silva	
	Subsystem/Office Integration and Test	
Document Title **Single Tower TKR Geometry for the LAT Simulation**		

Change History Log

Revision	Effective Date	Description of Changes

Gamma Ray Large Area Space Telescope (GLAST)
Large Area Telescope (LAT)
Integration &Test Subsystem
Single Tower TKR Geometry for the LAT Simulation

Contents

1. Purpose

This document defines the TKR geometry for the GLAST Large Area Telescope (LAT) to be implemented in the GLAST simulation.

2. Scope

This specification extracts from the TKR engineering drawings for the LAT a simplified version for the GLAST Simulation package. Whenever possible elements are described with simple solid shapes. Elements that are not thoroughly described are nevertheless listed to facilitate future updates to this document.

3. Definitions

3.1. Acronyms

GLAST	Gamma-ray Large Area Space Telescope
MCM	Multi Chip Module
LAT	Large Area Telescope
SSD	Silicon Strip Detector
TKR	Tracker

3.2. Definitions

mm	millimeter
Simulation	To examine through model analysis or modeling techniques to verify conformance to specified requirements

4. References

LAT-TD-00035- "LAT Coordinate System."

LAT-DS-00026- " Drawing - Assembly, Tracker Tray"

LAT-DS-00049- "GLAST Tracker Tower Mid Tray Face Sheet"

LAT-DS-00092- "GLAST Tracker, Tracker Tower, MCM Closeout Wall"

LAT-DS-00148- "GLAST Tracker, Mid Tray Assembly"

LAT-DS-00177-" LAT Tracker Dimensions and Masses"

LAT-DS-00180- "GLAST Tracker, Tracker Tray Assembly with Payload"

LAT-DS-00192- "Tracker Bias Circuit Assy"

LAT-DS-00303- "GLAST Tracker, Tracker Tower -X Sidewall"

LAT-DS-00594- "LAT Tracker Tray SSD Ladder Assy"

LAT-DS-00617-"LAT Tracker Super GLAST Face Sheet Top"

LAT-DS-00647-" LAT Tracker Super GLAST Mech Tray Assy"

LAT-DS-00722--" LAT Tracker Tower Assembly"

5. Description

The LAT 19 tracker trays are arranged in the following way: 12 regular trays with thin converter foils (top tray is included), 4 trays with thick converter foils, hereafter Super GLAST trays, and 3 trays with no converter foils (bottom tray is included).

All dimensions are provided in a spreadsheet at the end of this document.

5.1. General

Coordinate system—dimensions and values shall use the LAT Coordinate System as their reference for describing orientations and directions (if applicable). This is detailed in LAT-TD-00035-1 "LAT Coordinate System."

5.2. Dimensions

The dimensions listed here are nominal and in millimeters and do not reflect tolerances. When a number is underlined in a drawing (e.g. .360.5) it means that its value has been changed by hand for the purposes of this document.

5.2.1. Tower

Distances in Z between SSDs are referenced to the top of the silicon wafers (see SHEET 1).

5.2.2. Closeout

The closeout is modeled as a simple rigid object of only one thickness, which encloses the honeycomb core (see SHEET 2). Its height is different for top. bottom and middle trays (see SHEETS 5 and 6).

5.2.3. Honeycomb

The honeycomb is of the same thickness for all trays irrespective of its type (see SHEET 5).

5.2.4. Face Sheets

Face Sheet dimensions is slightly different in the X and Y coordinates (see SHEET 2). For the purposes of the simulation, they are built as square objects (see dimensions in spreadsheet). There are 2 face sheet thickness (see spreadsheet), however only one thin converter is labeled in the drawings (see SHEET3).

5.2.5. Converter

There is 2-converter thickness (see spreadsheet), however only one thin converter is labeled in the drawings (see SHEET4).

5.2.6. Multi-Chip Module (MCM)

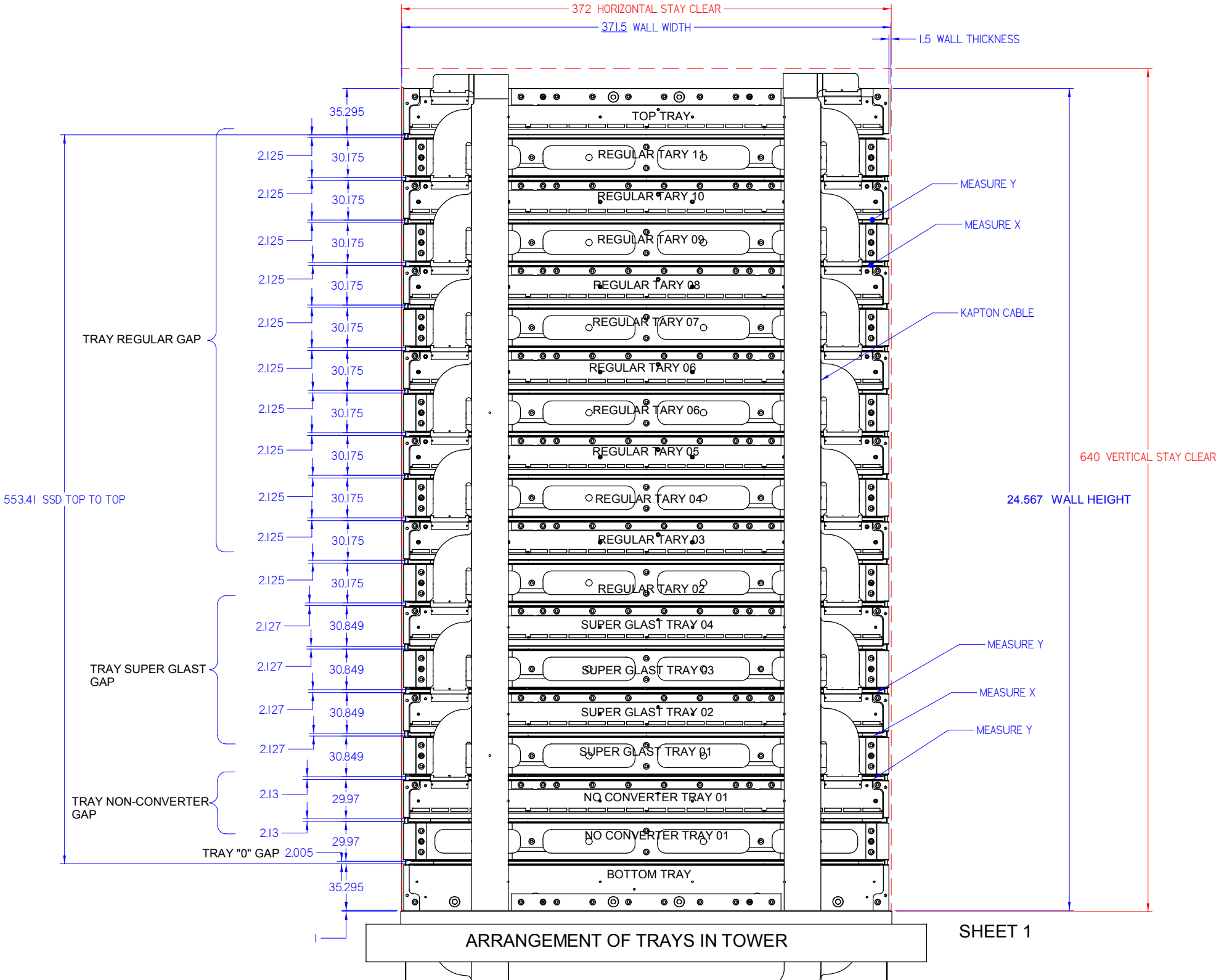
The MCM is modeled as a rigid object of only one thickness. Details on passive elements and ASICS are not incorporated in the simulation (see SHEETS 5,6 and 7) Most of it is 21.82 mm (narrow section) but close to the connectors the value increases to 28.399 mm (see SHEET 7). Since we have a Carbon Fiber thermal boss around we will assume only one height of 28.399 for the MCM.

5.3. Spreadsheet and Drawings

LAT TKR EM Dimensions for Simulation — **Print Date:** 10-Jul-02

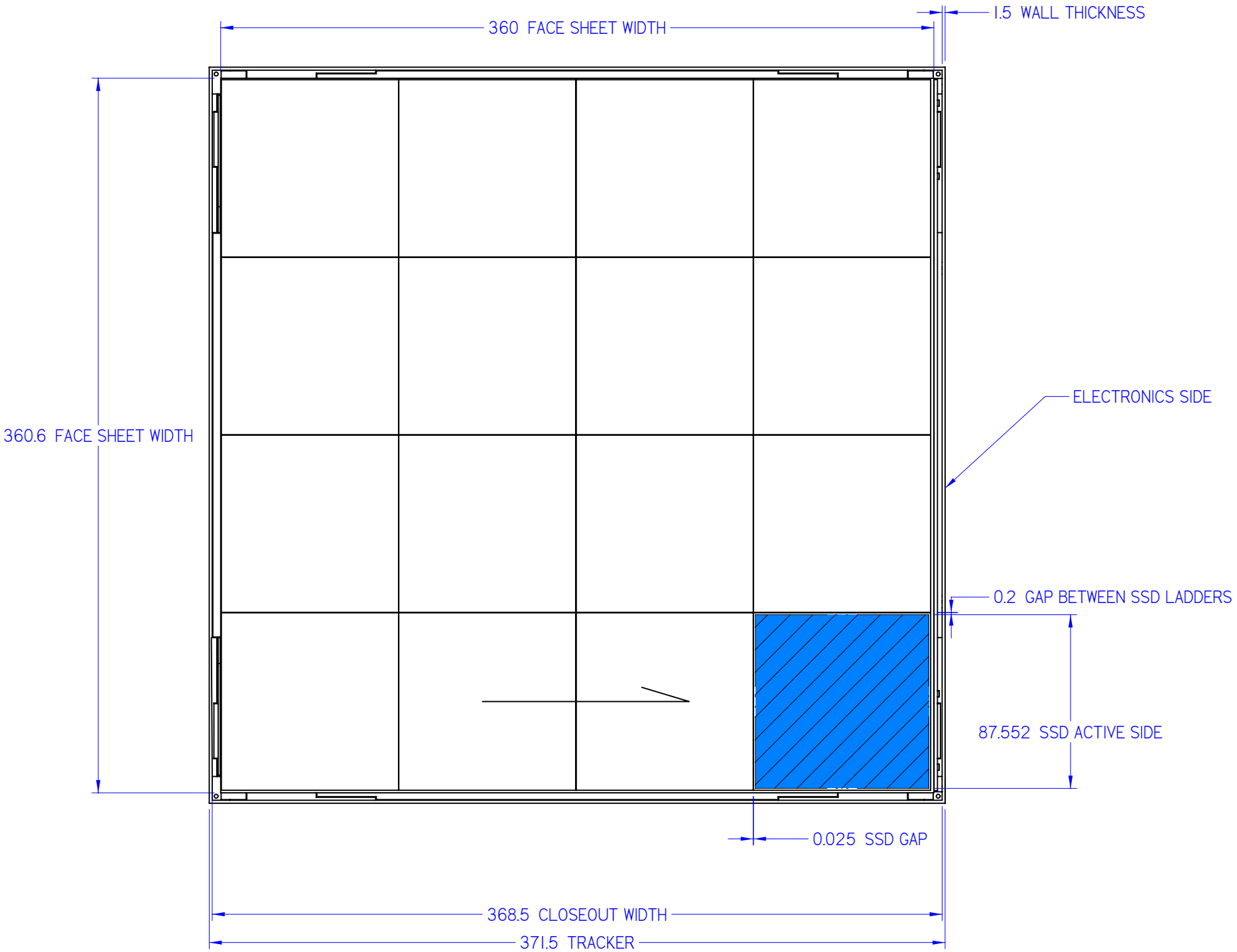
Eduardo do Couto e Silva — **Rev Date:** 10-Jul-02

Name in the XML file (TKRPrim)	Engineering Name	Dimensions		Simulation Drawing		Engineering Drawing	
		Value	Units	Document	Sheet	Document	
TKRTransverseStayClear	Transverse Stay Clear	372.0	mm	LAT-TD-00828	1	LAT-DS-00722 *	Tranverse dimension of TKR Stay Clear envelope
TKRVertStayClear	Vertical Stay Clear	640.0	mm	LAT-TD-00828	1	LAT-DS-00722 *	Z dimension of TKR Stay Clear envelope
TKRWallThick	Wall thickness	1.5	mm	LAT-TD-00828	1	LAT-DS-00303	Thickness of tracker walls
TKRWallLength	Wall width	371.45	mm	LAT-TD-00828	1	LAT-DS-00303	Outer dimension of square formed by tracker walls (Z cross-section)
tray0Gap	N/A	2.005	mm	LAT-TD-00828	1	LAT-DS-00722 *	Gap above bottom tray, Gap between Si and Si
trayNoCnvGap	N/A	2.130	mm	LAT-TD-00828	1	LAT-DS-00722 *	Gap above non-bottom no-converter trays
traySuperGap	N/A	2.127	mm	LAT-TD-00828	1	LAT-DS-00722 *	Gap above super-glast trays
trayRegGap	N/A	2.125	mm	LAT-TD-00828	1	LAT-DS-00722 *	Gap above regular trays
TKRTotalZ	Tracker Height	624.7	mm	LAT-TD-00828	1	LAT-DS-00722 *	Height of a tracker tower wall
ssdGap	SSD gap	0.025	mm	LAT-TD-00828	2	LAT-DS-00594	gap between Si dies within a ladder
SiWaferSide	SSD side	89.5	mm	LAT-TD-00828	2	LAT-DS-00026	Length and width of Si wafer
SiWaferActiveSide	SSD Active side	87.552	mm	LAT-TD-00828	2	LAT-DS-00026	Length and width of active area on a wafer
faceWidth	Face Sheet width	360.6	mm	LAT-TD-00828	2	LAT-DS-00148	X and y width of face sheet. The face sheet width is not square and extends beyond the SSD. For the simulation it is implemented as a square object
TKRElectGap (Obsolete)	N/A	4.2	mm	LAT-TD-00828	N/A	N/A	Distance between wall and panel edge (each edge)
ladderGap	Ladder gap	0.20	mm	LAT-TD-00828	2	LAT-DS-00148	gap between ladders
coreThick	Honeycomb core thickness	27.92	mm	LAT-TD-00828	5	LAT-DS-00148	Thickness of core material in all trays except the bottom and top
coreThickOuter	Honeycomb core thickness for top and bottom trays	21.07	mm	LAT-TD-00828	6		Core thickness for bottom and top trays. The core for top and botom is thinner but the closeout itself is thicker
closeoutThickTop	Closeout height - Top tray	34.27	mm	LAT-TD-00828	6	LAT-DS-00148	Closeout thickness for top tray. The core for top and botom is thinner but the closeout itself is thicker
closeoutThickMid	Closeout height - Regular tray	34.27	mm	LAT-TD-00828	5	LAT-DS-00148	The closeout is of the same dimensions as the core thickness
closeoutThickBot	Closeout height - Bottom tray	34.27	mm	LAT-TD-00828	6	LAT-DS-00148	Core thickness for bottom tray. The core for top and botom is thinner but the closeout itself is thicker
TKRCloseoutWidth	Closeout width	5	mm	LAT-TD-00828	3	LAT-DS-00092	Width of closeout walls on the side of the electronics, the other side is thicker (~ 7 mm). We will simulate 5 mm for all sides and assume holes do not exist
glueSiThick	Silicone Adhesive	0.15	mm	LAT-TD-00828	3,4	LAT-DS-00180*	Thickness of glue between Si and bias plane
glueCoreThick	Film Adhesive	0.075	mm	LAT-TD-00828	3,4	LAT-DS-00148	Thickness of glue between core (or closeout) and something else
glueDefThick	EPOXY	0.100	mm	LAT-TD-00828	3,4	LAT-DS-00148	Default glue thickness, when neither Si nor core is involved
convThickReg	converter thickness	0.105	mm	LAT-TD-00828	3,4	LAT-DS-00148	Thickness of conversion material in "regular" trays
convThickSup	converter thickness - Super GLAST	0.723	mm	LAT-TD-00828	3,4	LAT-DS-00647	Thickness of conversion material in super-GLAST trays
faceThick	Face sheet thickness	0.200	mm	LAT-TD-00828	3,4	LAT-DS-00049	Face sheet thickness for all but super-glast layers
faceSupThick	Face sheet thickness - Super GLAST	0.290	mm	LAT-TD-00828	3,4	LAT-DS-00617	Face sheet thickness for super-glast layers
biasPlaneThick	Bias Plane thickness	0.100	mm	LAT-TD-00828	3,4	LAT-DS-00192	Thickness of bias plane
SiThick	SSD thickness	0.4	mm	LAT-TD-00828	3,4	LAT-DS-00026	Si thickness
MCMHeight	MCM height	23.0	mm	LAT-TD-00828	5	LAT-DS-00177	Height of tracker MCM boards. Most of it is 21.82 mm (narrow section) but close to the connectors the value increases to 28.399 mm. Since we have a Carbon Fiber thermal boss around we will assume only one height of 28.399 for the MCM.
MCMThick	MCM thickness	1.1	mm	LAT-TD-00828	5	LAT-DS-00177	Thickness of tracker MCM boards
MCMGap	MCM gap	0.1	mm	LAT-TD-00828	5	LAT-DS-00148	Gap between MCM board and closeout

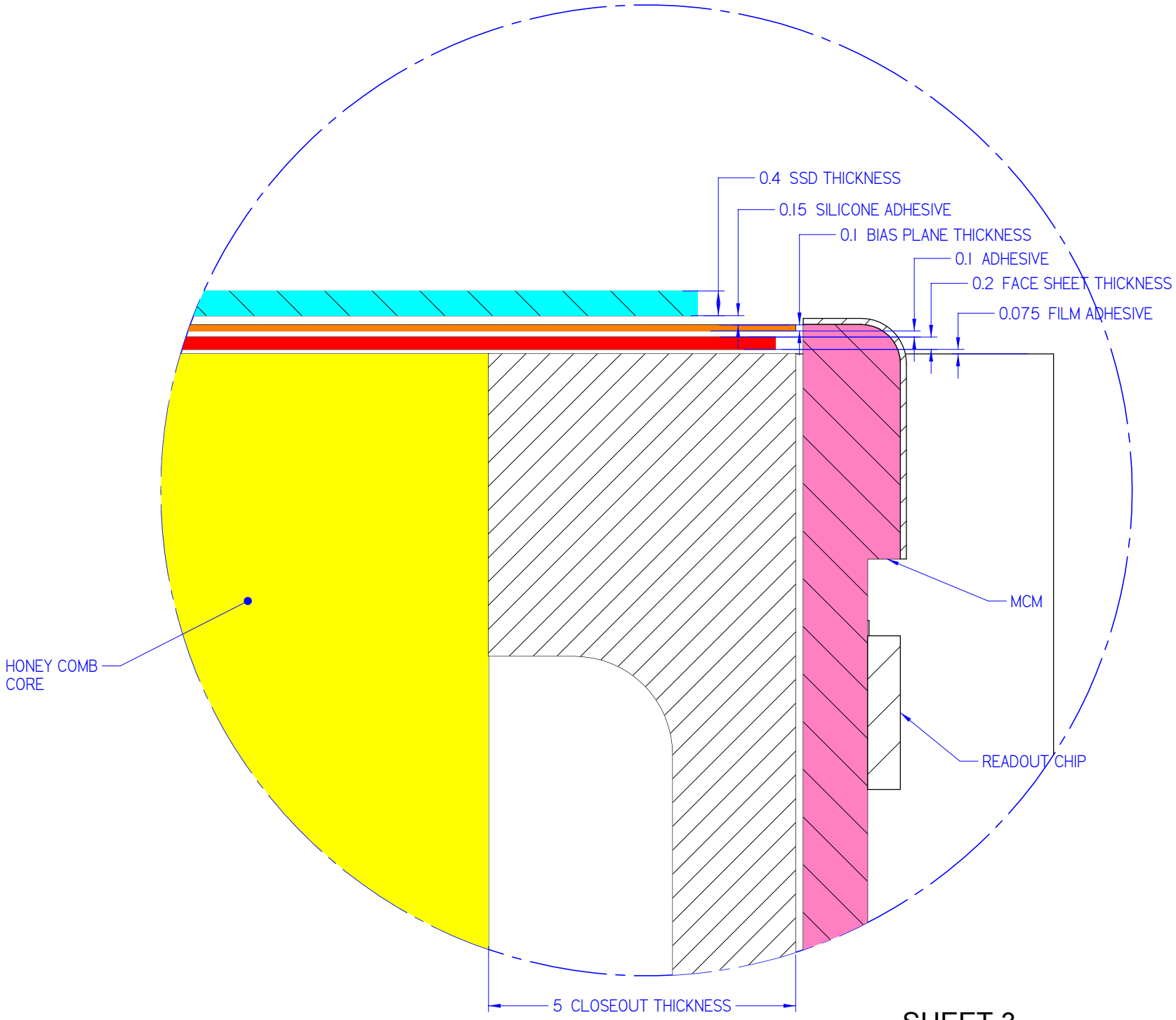


ARRANGEMENT OF TRAYS IN TOWER

SHEET 1

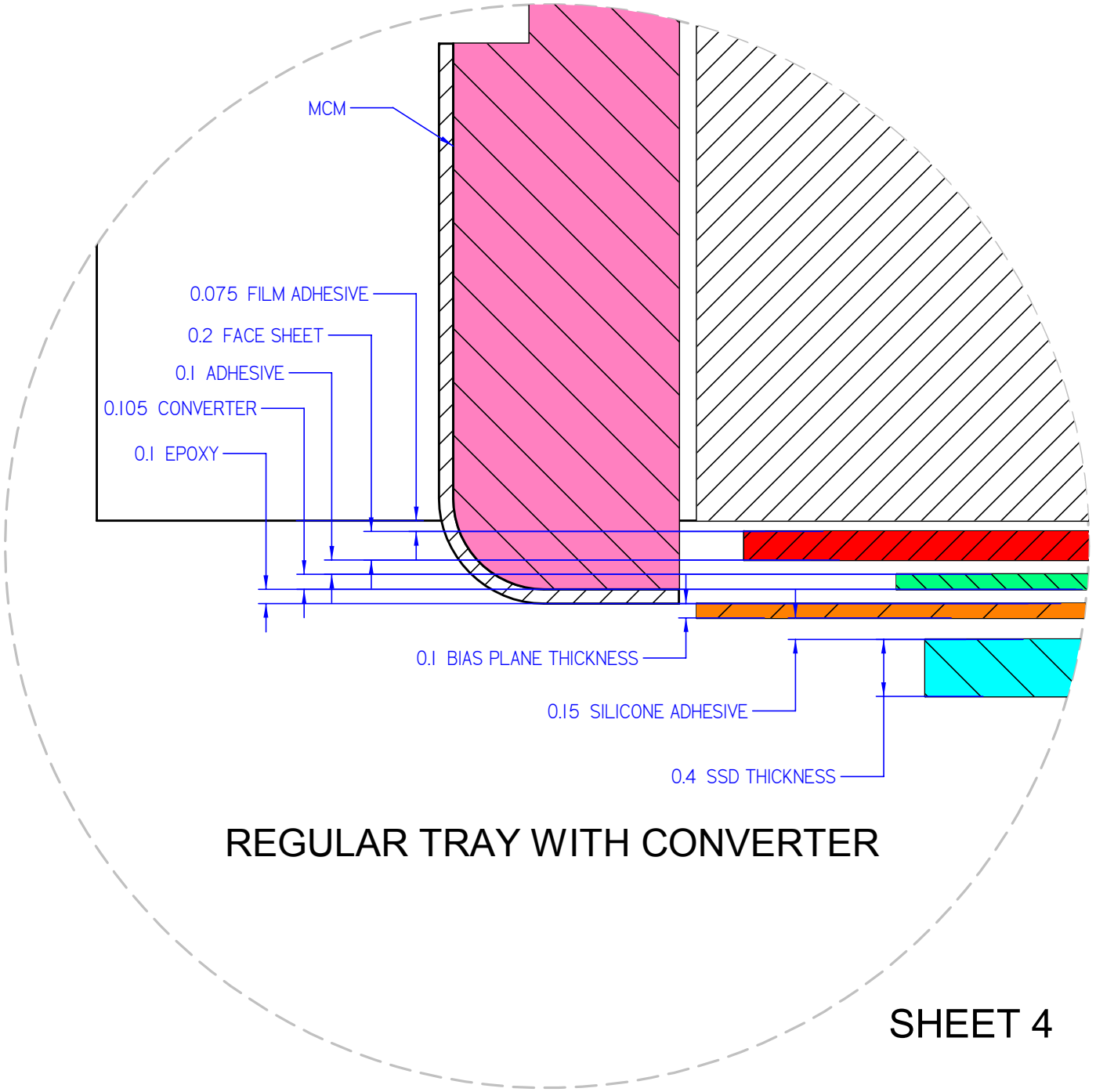


TRACKER TRAY TOP VIEW



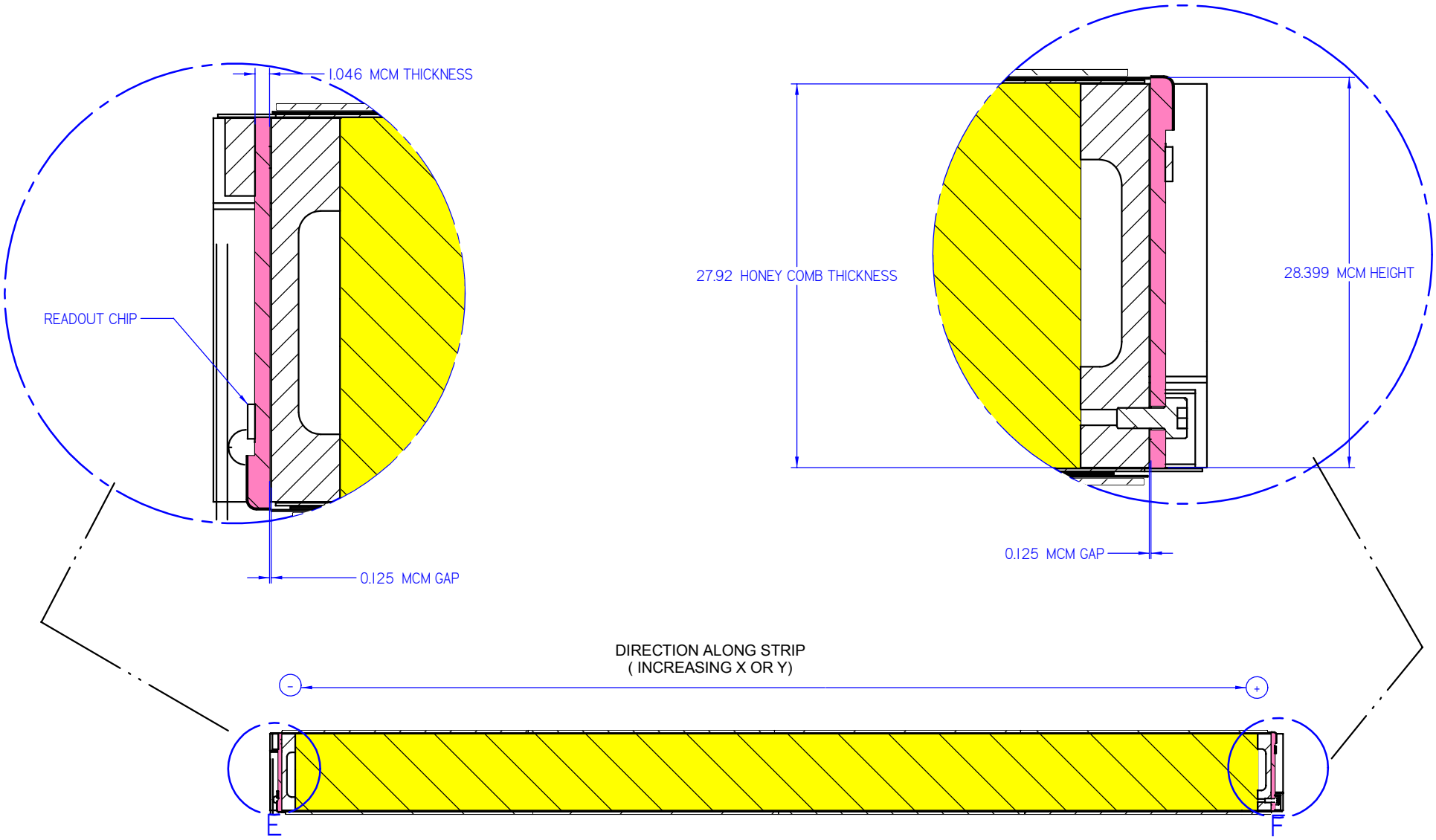
SHEET 3

REGULAR TRAY TOP (NO CONVERTER)



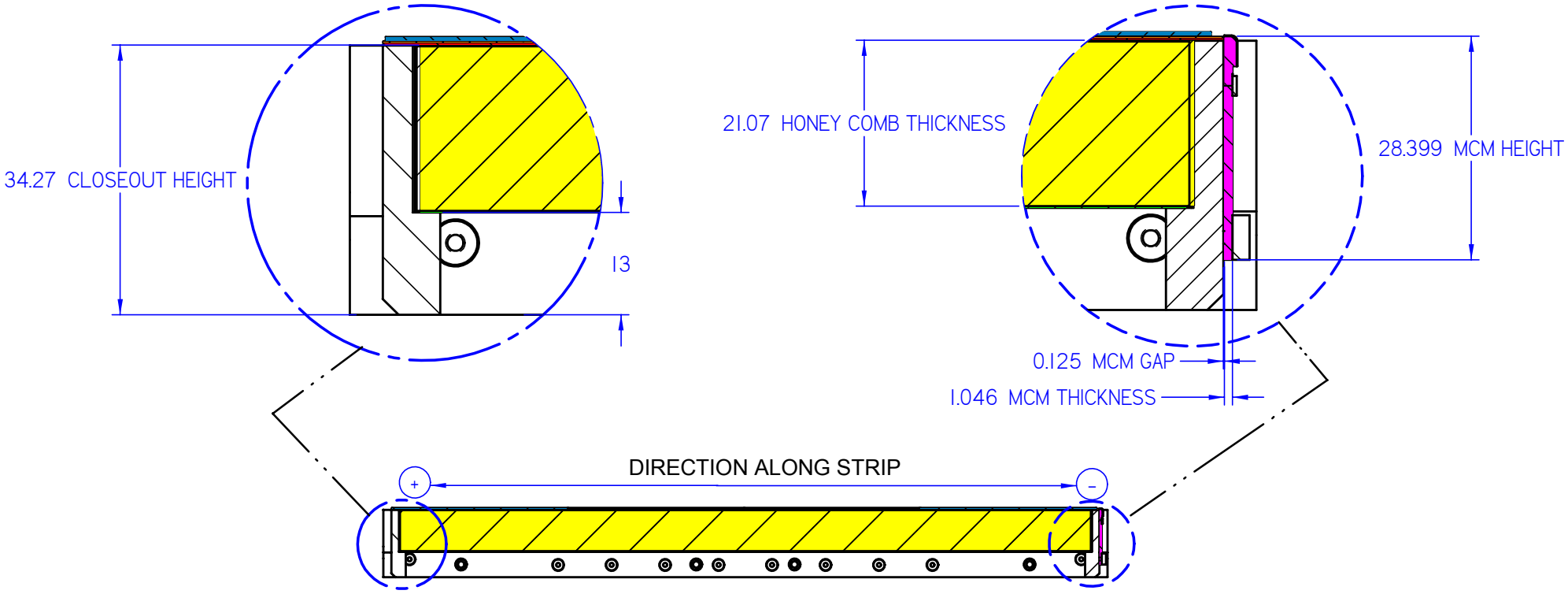
REGULAR TRAY WITH CONVERTER

SHEET 4



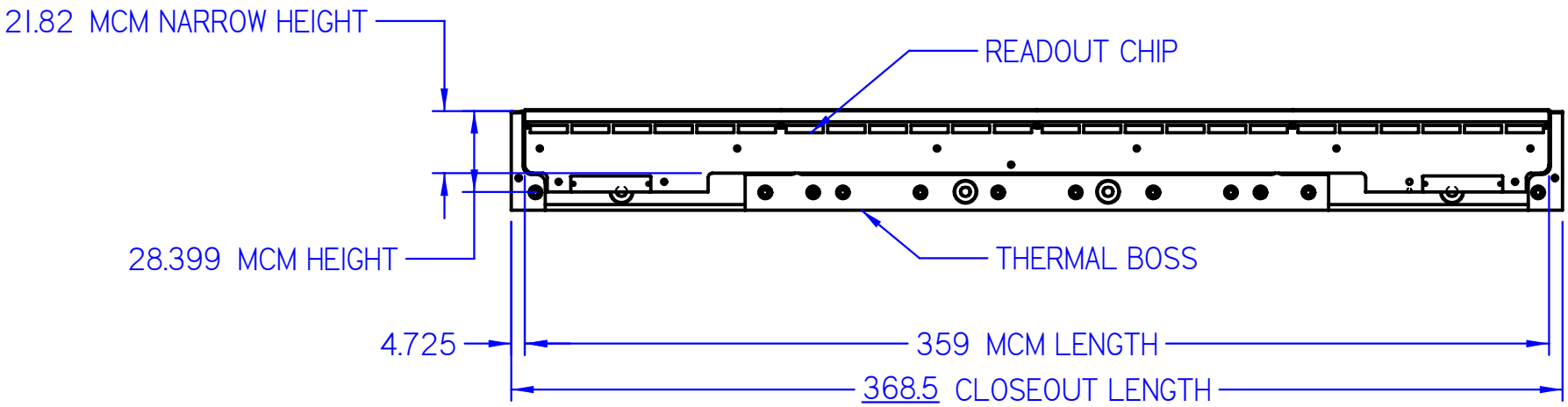
THE MCM BOARD A POSITIVE X/Y END OF THE TRAY FEEDS THE TOP LAYER OF SSD LADDER
AND THE ONE AT THE NEGATIVE END FEEDS THE BOTTOM LAYER.
(TOP AND BOTTOM TRAYS HAVE ONLY ONE MCM BOARD)

CLOSEOUT AND MCM BOARD SECTION VIEW REGULAR TRAY



TOP AND BOTTOM TRAYS HAVE ONLY ONE MCM BOARD

CLOSEOUT AND MCM SECTION VIEW
TOP & BOTTOM TRAY



SHEET 7

TRAY ELECTRONICS SIDE