



SAS-3 RIGHT ANGLE SURFACE MOUNT CONNECTOR

BOARD ROUTING RECOMMENDATIONS

TABLE OF CONTENTS

1.0 SCOPE

2.0 PC BOARD REQUIREMENTS

- 2.1 MATERIAL THICKNESS
- 2.2 LAYOUT

3.0 HIGHSPEED ROUTING

- 3.1 GENERAL ROUTING EXAMPLE
- 3.2 HIGH SPEED TRANSMISSION LINE PLANE
- 3.3 HIGH SPEED REFERENCE PLANE ANTI-PAD
- 3.4 TRACE TO PAD ATTACHMENT
- 3.5 GROUD VIA PLACEMENT
- 3.6 SIGNAL THROUGH-HOLE VIA STUBS
- 3.7 SKEW COMPENSATION FOR DIFFERENTIAL ROUTING
- 3.8 TRACE COMPARISON

REVISION: C	ECN INFORMATION: EC No: S2014-1288 DATE: 2014/06/27	TITLE: SI Routing Guidelines for SAS-3 5.85mm Height Right Angle Surface Mount Connector	SHEET No. 1 of 10
DOCUMENT NUMBER: AS-78844-001	CREATED / REVISED BY: CMWONG 2014/06/27	CHECKED BY: HELVY 2014/06/30	APPROVED BY: WTCHUA 2014/06/30



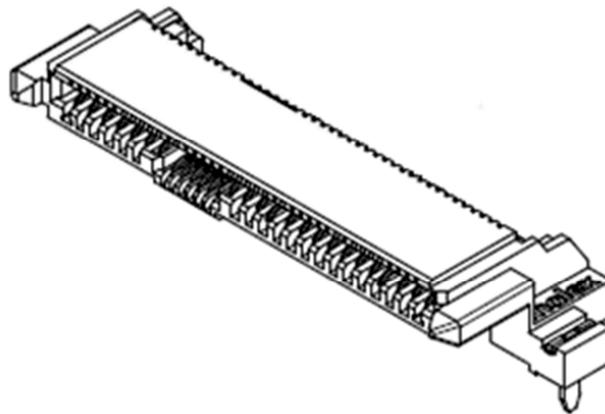
SAS-3 RIGHT ANGLE SURFACE MOUNT CONNECTOR

BOARD ROUTING RECOMMENDATIONS

1.0 SCOPE

This specification covers the high-speed PCB routing recommendations of high-speed signals for 12Gbps application at primary and secondary ports for 78844 series connector. The connector is a right angle surface mount type. The pins of the connector are soldered for mechanical retention to the PC board.

DISCLAIMER: Molex does not guarantee the performance of the final product to match the information provided in this document. All information in this report is considered proprietary, confidential and the property of Molex. This guide is not intended as a substitute for engineering analysis.



2.0 PC BOARD REQUIREMENTS

2.1 MATERIAL THICKNESS

The recommended PC board thickness shall be 2.36mm. Suitable PC board material shall be glass epoxy (FR-4).

2.2 LAYOUT

The solder pads for the connector assembly must be precisely located to ensure proper placement and optimum performance of the connector assembly. Refer to the applicable Sales Drawing for the recommended solder pad pattern, dimensions and tolerances.

REVISION: C	ECN INFORMATION: EC No: S2014-1288 DATE: 2014/06/27	TITLE: SI Routing Guidelines for SAS-3 5.85mm Height Right Angle Surface Mount Connector	SHEET No. 2 of 10
DOCUMENT NUMBER: AS-78844-001	CREATED / REVISED BY: CMWONG 2014/06/27	CHECKED BY: HELVY 2014/06/30	APPROVED BY: WTCHUA 2014/06/30

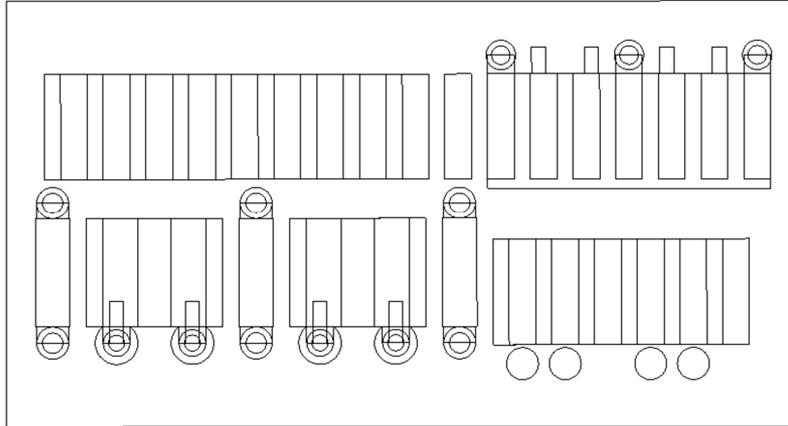


SAS-3 RIGHT ANGLE SURFACE MOUNT CONNECTOR

BOARD ROUTING RECOMMENDATIONS

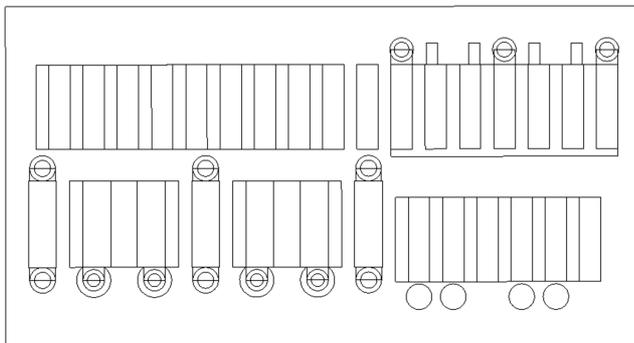
3.0 HIGH-SPEED ROUTING FOR 12Gbps APPLICATION

3.1 GENERAL ROUTING EXAMPLE (other configurations are possible)

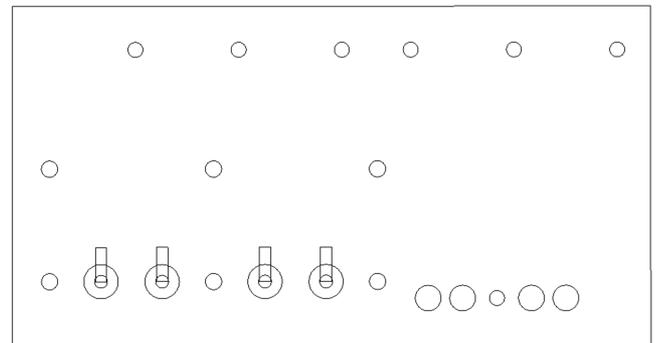


Only high-speed signals at primary and secondary ports are shown. Showing connector footprint, 2 high-speed signal layers and 1 reference ground layer overlaid. Routing example shown for reference only.

1st signal layer with reference layer



2nd signal layer with reference layer



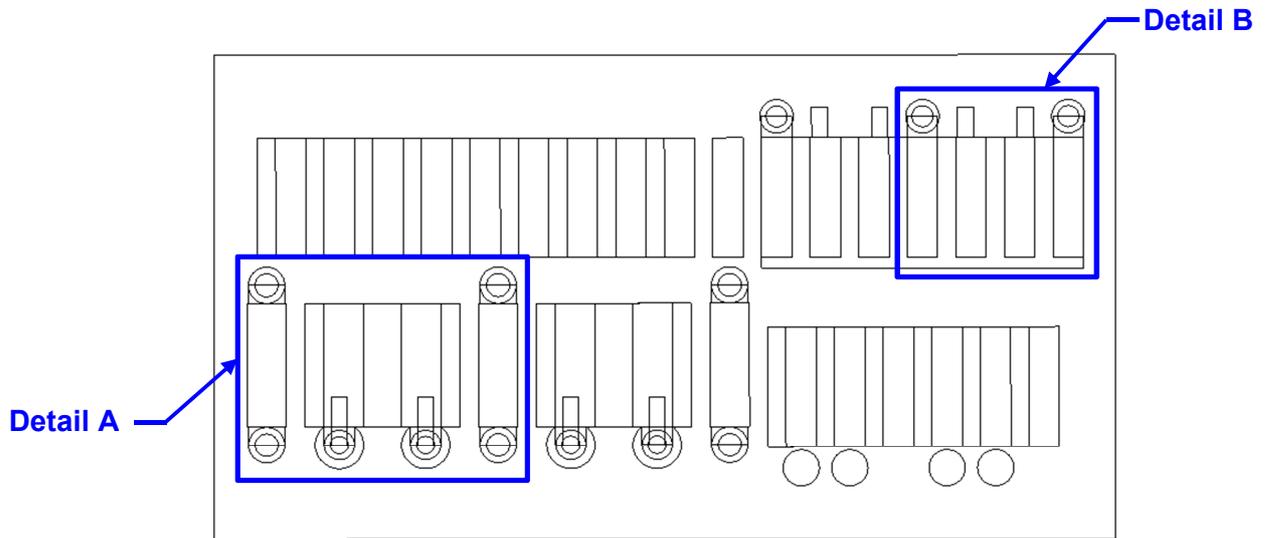
REVISION: C	ECN INFORMATION: EC No: S2014-1288 DATE: 2014/06/27	TITLE: SI Routing Guidelines for SAS-3 5.85mm Height Right Angle Surface Mount Connector	SHEET No. 3 of 10
DOCUMENT NUMBER: AS-78844-001	CREATED / REVISED BY: CMWONG 2014/06/27	CHECKED BY: HELVY 2014/06/30	APPROVED BY: WTCHUA 2014/06/30



SAS-3 RIGHT ANGLE SURFACE MOUNT CONNECTOR

BOARD ROUTING RECOMMENDATIONS

3.2 HIGH-SPEED TRANSMISSION LINE PLANE



Only high-speed signals at primary and secondary ports are shown. Shown with connector footprint and 1 reference ground layer. Routing example shown for reference only.

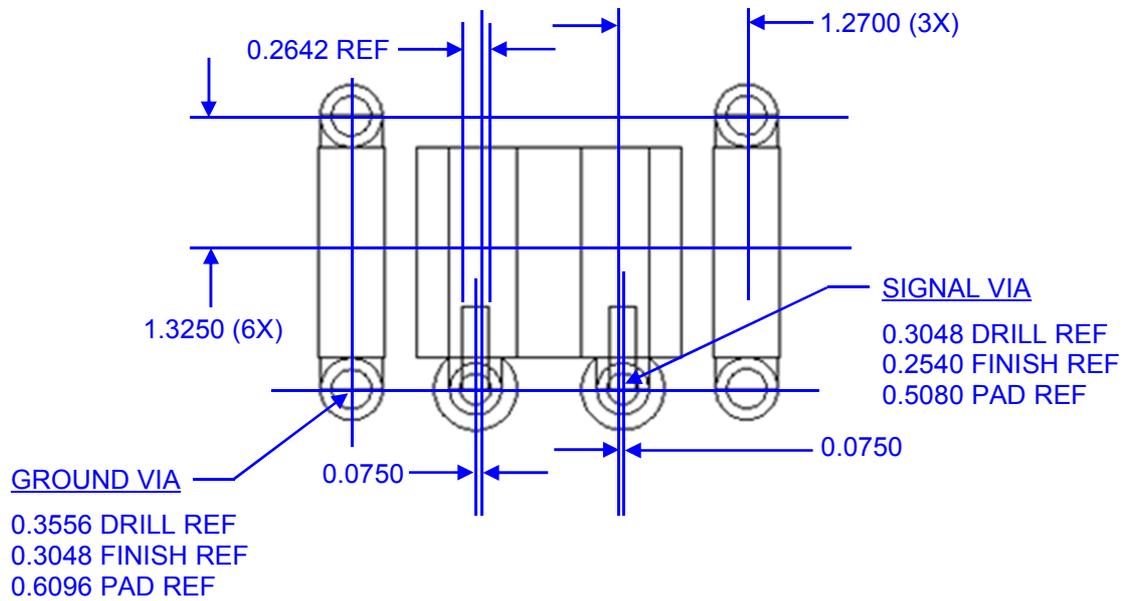
REVISION: C	ECN INFORMATION: EC No: S2014-1288 DATE: 2014/06/27	TITLE: SI Routing Guidelines for SAS-3 5.85mm Height Right Angle Surface Mount Connector	SHEET No. 4 of 10
DOCUMENT NUMBER: AS-78844-001	CREATED / REVISED BY: CMWONG 2014/06/27	CHECKED BY: HELVY 2014/06/30	APPROVED BY: WTCHUA 2014/06/30



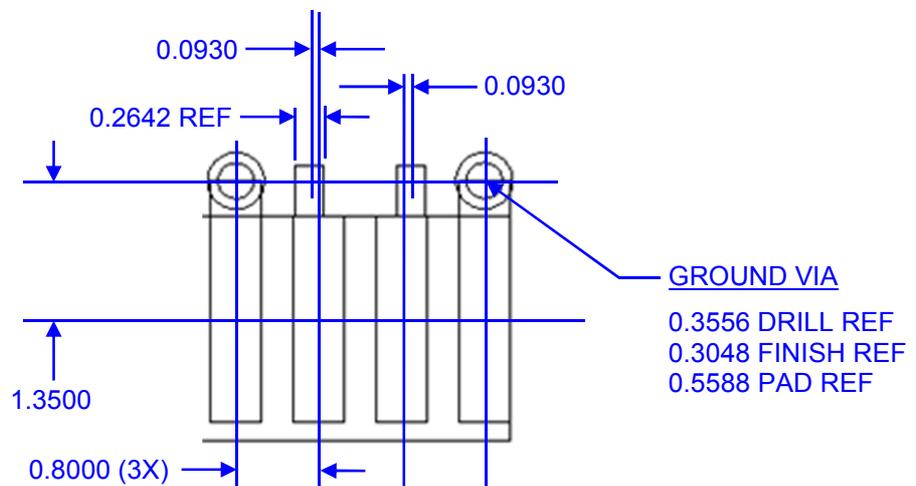
SAS-3 RIGHT ANGLE SURFACE MOUNT CONNECTOR

BOARD ROUTING RECOMMENDATIONS

Detail A (Applicable to SAS Primary Port)



Detail B (Applicable to both SAS Secondary and PCIe Ports)



Note: Trace width and via dimensions above can vary from recommendation to meet board thickness, routing and electrical requirements.

REVISION: C	ECN INFORMATION: EC No: S2014-1288 DATE: 2014/06/27	TITLE: SI Routing Guidelines for SAS-3 5.85mm Height Right Angle Surface Mount Connector	SHEET No. 5 of 10
DOCUMENT NUMBER: AS-78844-001	CREATED / REVISED BY: CMWONG 2014/06/27	CHECKED BY: HELVY 2014/06/30	APPROVED BY: WTCHUA 2014/06/30

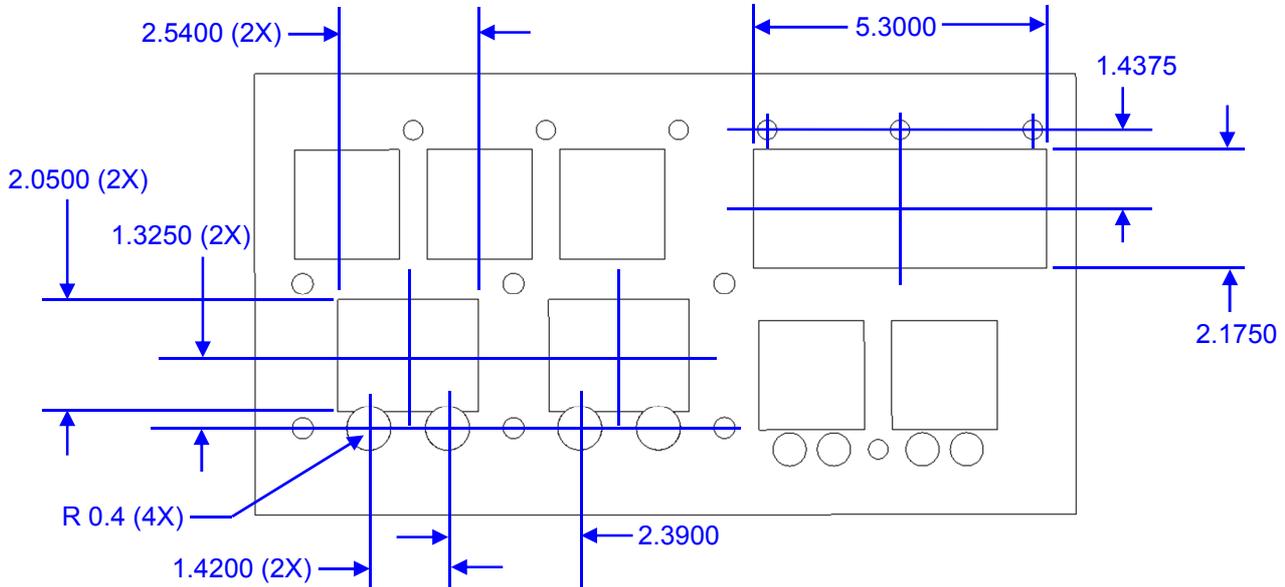


SAS-3 RIGHT ANGLE SURFACE MOUNT CONNECTOR

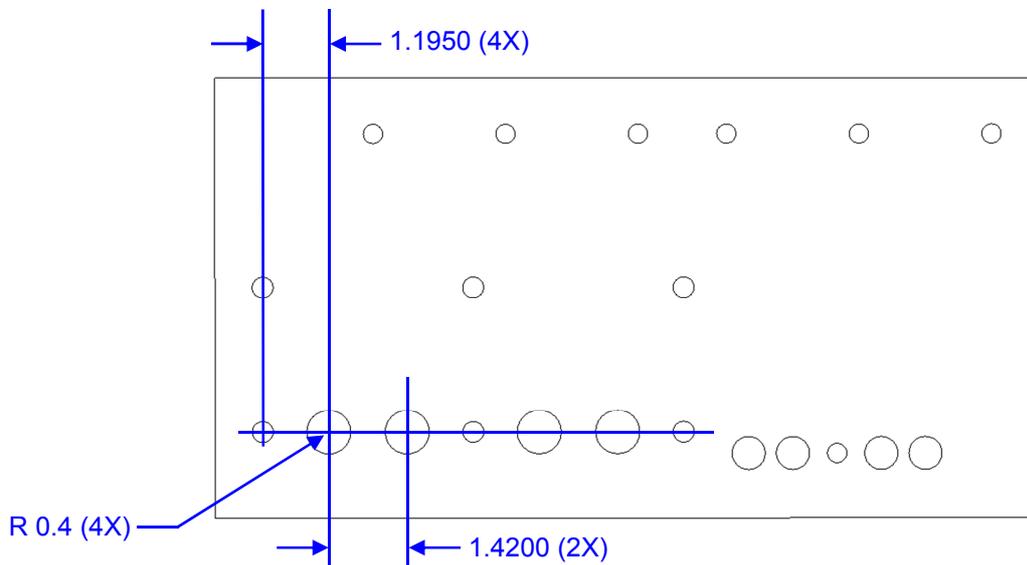
BOARD ROUTING RECOMMENDATIONS

3.3 HIGH-SPEED REFERENCE PLANE ANTI-PAD

Layer 2 Ground Plane (Beneath Connector Footprint)



All Other Ground Planes



Note: Anti-pad was implemented for impedance matching. Dimensions can vary from recommendation to meet electrical requirements. The anti-pad can be made larger with a broader keep-out region on non-signal ground planes to minimize parasitic capacitance.

REVISION: C	ECN INFORMATION: EC No: S2014-1288 DATE: 2014/06/27	TITLE: SI Routing Guidelines for SAS-3 5.85mm Height Right Angle Surface Mount Connector	SHEET No. 6 of 10
DOCUMENT NUMBER: AS-78844-001	CREATED / REVISED BY: CMWONG 2014/06/27	CHECKED BY: HELVY 2014/06/30	APPROVED BY: WTCHUA 2014/06/30



SAS-3 RIGHT ANGLE SURFACE MOUNT CONNECTOR

BOARD ROUTING RECOMMENDATIONS

3.4 TRACE TO PAD ATTACHMENT (FOR BOTH MICROSTRIP AND STRIPLINE ROUTING)

There are several ways to connect the traces to their corresponding signal pads. Two possible methods are illustrated in Figures 1 and 2.

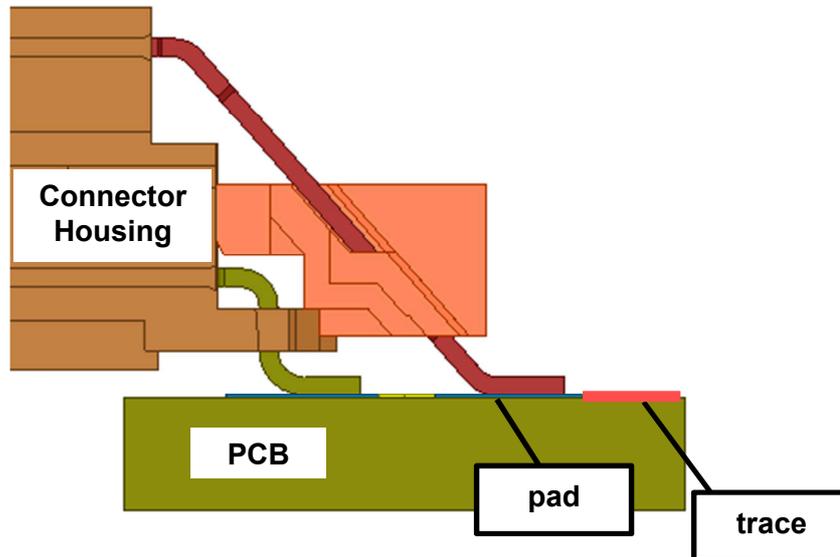


Figure 1

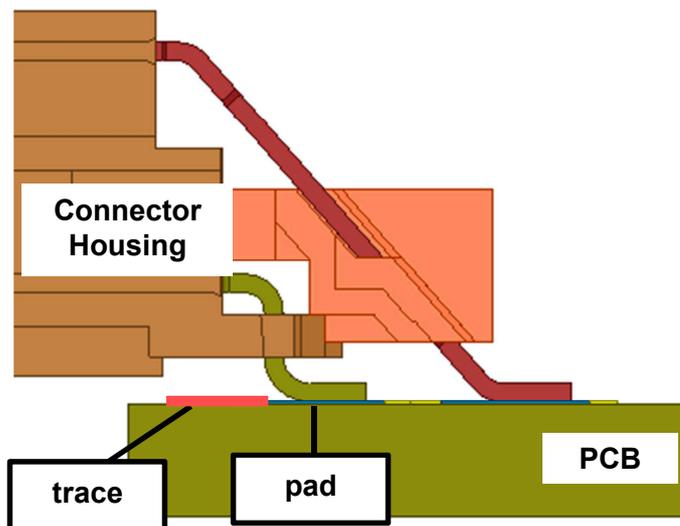


Figure 2

As seen in Figure 1, trace routed outwards from pad of connector will result in minimum pad stub while worst case pad stub occurs when trace is routed inwards as shown in Figure 2.

REVISION: C	ECN INFORMATION: EC No: S2014-1288 DATE: 2014/06/27	TITLE: SI Routing Guidelines for SAS-3 5.85mm Height Right Angle Surface Mount Connector	SHEET No. 7 of 10
DOCUMENT NUMBER: AS-78844-001	CREATED / REVISED BY: CMWONG 2014/06/27	CHECKED BY: HELVY 2014/06/30	APPROVED BY: WTCHUA 2014/06/30



SAS-3 RIGHT ANGLE SURFACE MOUNT CONNECTOR

BOARD ROUTING RECOMMENDATIONS

3.5 GROUND VIA PLACEMENT

PCB Top View

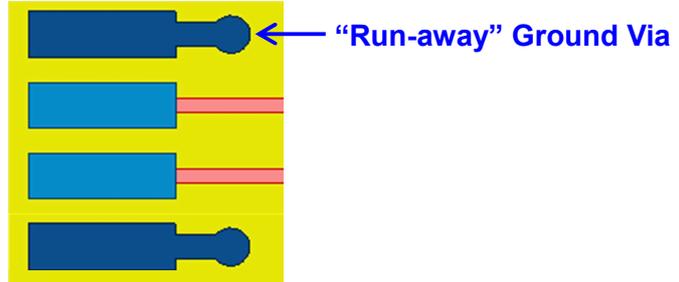


Figure 3

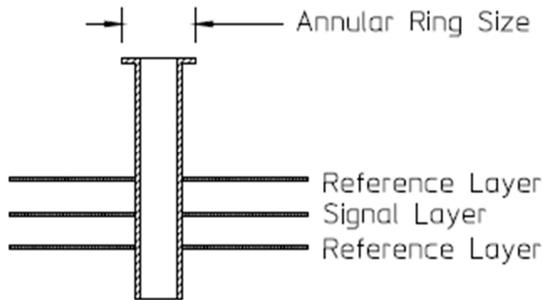
As seen in Figure 3, “run-away” ground vias from ground pads should follow the direction where the signal traces were attached to their corresponding signal pads.

REVISION: C	ECN INFORMATION: EC No: S2014-1288 DATE: 2014/06/27	TITLE: SI Routing Guidelines for SAS-3 5.85mm Height Right Angle Surface Mount Connector	SHEET No. 8 of 10
DOCUMENT NUMBER: AS-78844-001	CREATED / REVISED BY: CMWONG 2014/06/27	CHECKED BY: HELVY 2014/06/30	APPROVED BY: WTCHUA 2014/06/30

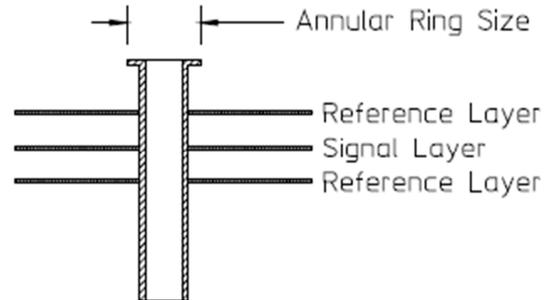


SAS-3 RIGHT ANGLE SURFACE MOUNT CONNECTOR BOARD ROUTING RECOMMENDATIONS

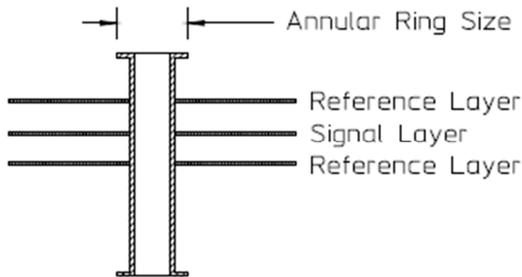
3.6 SIGNAL THROUGH-HOLE VIA STUBS (FOR STRIPLINE ROUTING)



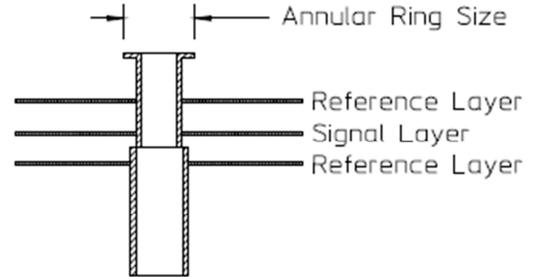
**Bottom Launch
Driven Via
(Preferred)**



**Top Launch
Stub Via
(Worst Case)**



Standard Via Configuration



Back Drill To Minimize Stub

Only the signal reference ground planes are shown above and only two annular rings are required for retention of the through-hole via within the printed circuit board. Non-functional annular rings should be removed for unassociated signal layers.

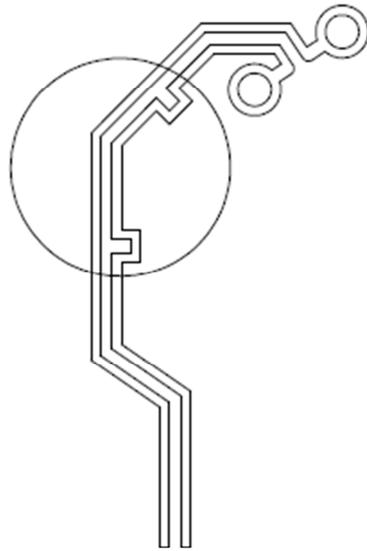
REVISION: C	ECN INFORMATION: EC No: S2014-1288 DATE: 2014/06/27	TITLE: SI Routing Guidelines for SAS-3 5.85mm Height Right Angle Surface Mount Connector	SHEET No. 9 of 10
DOCUMENT NUMBER: AS-78844-001	CREATED / REVISED BY: CMWONG 2014/06/27	CHECKED BY: HELVY 2014/06/30	APPROVED BY: WTCHUA 2014/06/30



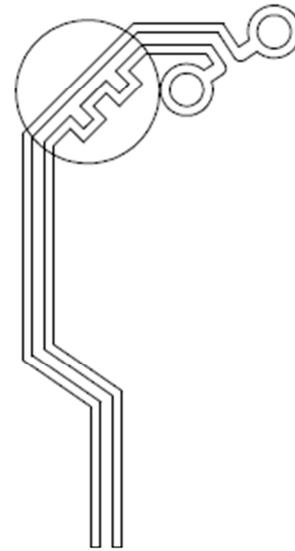
SAS-3 RIGHT ANGLE SURFACE MOUNT CONNECTOR

BOARD ROUTING RECOMMENDATIONS

3.7 SKEW COMPENSATION FOR DIFFERENTIAL ROUTING



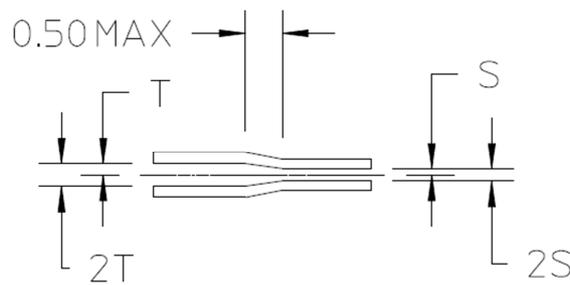
PREFERRED



NOT RECOMMENDED

It is recommended that skew compensation be distributed verses grouped in one or more locations.

3.8 TRACE COMPARISON



TRANSITION SHOULD BE SYMMETRIC

REVISION: C	ECN INFORMATION: EC No: S2014-1288 DATE: 2014/06/27	TITLE: SI Routing Guidelines for SAS-3 5.85mm Height Right Angle Surface Mount Connector	SHEET No. 10 of 10
DOCUMENT NUMBER: AS-78844-001	CREATED / REVISED BY: CMWONG 2014/06/27	CHECKED BY: HELVY 2014/06/30	APPROVED BY: WTCHUA 2014/06/30