

Application of Samtec breakout adapters in differential pair / mix design applications

ZX100 series products

Zebax offers best in class breakout adapters supporting Samtec Q-Series® High Speed Strip connectors. Zebax Samtec breakout adapters exhibit excellent signal integrity and improved performance designed for applications such as : testing, bringup, software development debugging and emulation. This document outlines general features of Samtec Q Series® HI-Speed Strip connector technology and Zebax coverage of Q-Series® connectors in single ended and differential pair designs.

This document identifies:

1. Samtec Q Series HIGH SPEED Strip connector Technology
2. Zebax breakout adapters covering Samtec Q series connectors
3. Application of Zebax breakout adapters in differential pair designs

Revision History

Version	Date	Description
v01	Jan 27, 2017	updated

1 Samtec Q Series HI-SPEED Strip connector Technology

Samtec Q-Strip® hi-speed connectors are offered in 0.5mm, 0.635mm, 0.8mm pitch offering pin counts from 40 to 240 in single ended and 28 to 160 in differential pair configurations. The Q-Series board to board connectors offer performance exceeding 8GHz/9.5GHz bandwidth due to their contacts, surface mount, and ground shielding making them the industry standard for board-to-board in digital and analog designs, Mixed technology.

Table 1 summarizes Samtec high speed board to board connector's feature including the single ended / differential pair offering. QTH, and QSH connectors are one of the Q-Strip connector types offered by Samtec with wide industry acceptance due to their high performance and ground shielding. QSH/QTH series connectors are offered in single ended and differential configuration. The single ended, SE, connectors are commonly used and it is offered in 60 (30 pins per row) , 120(60) , 180(90) , 240(120) pins whereas the differential pair signaling is by pair, maintaining the 50 Ω impedance at each 2 pins where the 3rd signal is left empty. Differential pair , DP, connectors are offered in 40(20 pins per row) , 40(80), 60(120), 80(160).

Table 1 – Summary of Samtec high speed connector supported by Zebax breakout adapter

Series	Q Series						Basic Blade & Beam	
	QMS(S) / QFS(S)	QTH / QSH		QTS / QSS	MIT / MIS	QTE / QSE	BTH / BSH	
Pitch	0.635mm		0.5mm		0.635mm	0.635mm	0.8mm	0.5mm
Mezzanine Heights (mm) ¹	10, 11, 12, 13, 14, 16		5, 8, 11, 16, 19, 25		5, 8	5, 8, 11, 16, 19, 25	5, 8, 11, 16, 19, 25	5
Signaling type	SE	DP	SE	DP	SE	SE	SE	SE
Pin Counts	52, 104	32 68	60, 120	40, 80	50, 100, 150	38, 76	40, 80	60, 100, 120, 180
	156	96 128	180, 240	120, 160	200	114	120, 84, 160	240, 300
Performance (10mm Stack)	9GHz / 18Gbps	7GHz / 14Gbps	9GHz / 18GHz	9.5GHz / 19 Gbps	9GHz / 18Gbps	9GHz / 18Gbps	9 GHz / 17GHz	9GHz / 18GHz
Data Rate Mate	50 Ω	100 Ω ²	50 Ω	100 Ω	50 Ω	50 Ω	50 Ω 100 Ω	50 Ω
Zebax Breakout Adapter	ZX153 ZX154 ZX155		ZX100 ZX101 ZX102 ZX103 ZX106 ZX107 ZX108 ZX109		ZX140 ZX141 ZX142 ZX144	ZX137-19 ZX137-38 ZX137-57	ZX145 ZX146 ZX147 ZX148 ZX149	ZX131 ZX132 ZX133 ZX134 ZX135

- 1- Stack height when both header & socket are connected.
- 2- Differential pair
- 3- QMS / QFS Mezzanine Heights (mm) are 10, 11, 12, 13, 14, 16

2 Zebax breakout adapters covering Samtec Q series connectors

Zebax offers best in class breakout adapters supporting Samtec Q-Series® connectors. [ZX100 series breakout adapters](#) are multi-layers PCB offering improved signal integrity and performance. Zebax offers breakout solutions for the followings Q-Series connectors:

QMS(S) / QFS(S)	QTH / QSH	QTS / QSS	MIT / MIS	QTE / QSE	BTH / BSH
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Please check www.Zebax.com for the latest updates on new or existing Q-Series breakout adapters.

3 Application of Zebax breakout adapters in differential pair designs

Zebax breakout adapters cover Samtec Q-Series® board to board connectors in primary single ended connector configuration covering full length of connectors by supporting all available pins on single ended design. Given the fact the differential pair connectors are derivative of the single ended connectors by missing one pin on every other pairs, the Zebax breakout adapters fully cover designs using the Samtec differential pair connectors as well.

Zebax breakout adapters, ZX100 product family, are intended for purpose of debugging, evaluation of sub-modules, bringup and testing. Although the ZX100 family are designed with 50 Ω impedance traces, it is not expected to expect full GHz performance from breakout adapter rather facilitating testing, and debugging at 1GHz bandwidth performance. The losses are primarily attributed to headers. ZX100 series breakout adapters are designed in 4 layers PCB with no via and 50 Ω impedance traces meeting both analog as well as digital world requirements.

[FPGA Mezzanine Card, Vita 57.1](#) and [Altera High Speed Mezzanine Card, AHSMC](#) modules are typically designed using 6, 8, 10 and 12 layers due to complexity of signal routing while maintaining best possible signal integrity and module performance.

DOCUMENT : [Samtec-QSHQTH-DP](#)

SUBJECT: [Application of Zebax breakout adapters in differential pair design](#)

Zebax offers best in class [Samtec](#) [Mictor](#) [FMC VITA 57.1](#) [AHSMC](#) [PCISIG](#) [M.2](#) [PCIe/104](#) [PCI/104-Express](#) and more breakout test modules extension boards. ZX100 products are widely used in test, debug, validation and characterization of engineering efforts in R&D as well as automation test environment and manufacturing test areas.

Zebax is dedicated in providing best in class solutions supporting engineering and technical communities in test and measurements disciplines.

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