Passively Probing a Motorola MPC8240 Target System with E5346A High-Density Termination Adapters

Product Note

Solutions for
Digital System Debug

Agilent Technologies

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This product note describes how to connect an Agilent logic analyzer to the BGA package of a Motorola MPC8240 target system for use with an inverse assembler.

Signals required for inverse assembly are shown in the pinout information table beginning on page 7 and must be routed to AMP Mictor 38 connectors for connection to the logic analyzer.

Eight, 16-channel logic analyzer pods are required for inverse assembly. These eight pods are connected via the Mictor connectors to four high-density termination adapters. The adapters are not included with the inverse assembler and must be ordered separately.

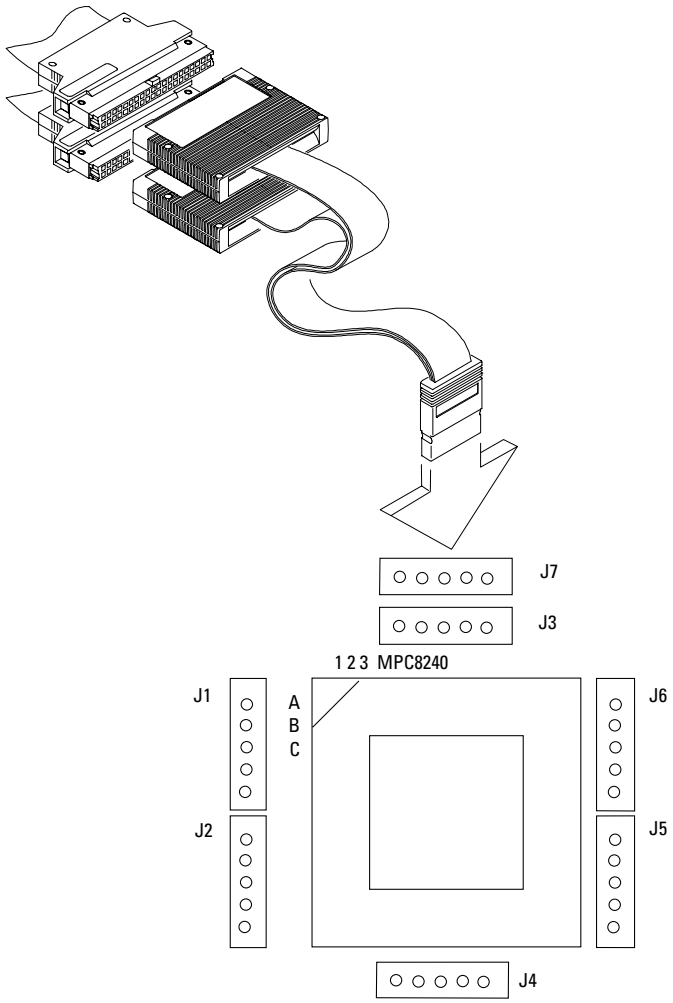

Figure 1. Connector Layout for a Motorola PowerPC 740/750 BGA Target

Direct Connection through E5346A High-Density Adapter Cables

The E5346A high-density adapters use a minimal amount of board space. Each high-density adapter connects two logic analyzer pods, providing 32 channels of logic analysis per connector and access to two clock pins, as shown in figure 2.

Grounds need to be connected to pin 3 of the AMP Mictor connector. SCL, +5VDC and SDA are not to be connected to the target system (pins 1, 2, and 4 on the Mictor connector).

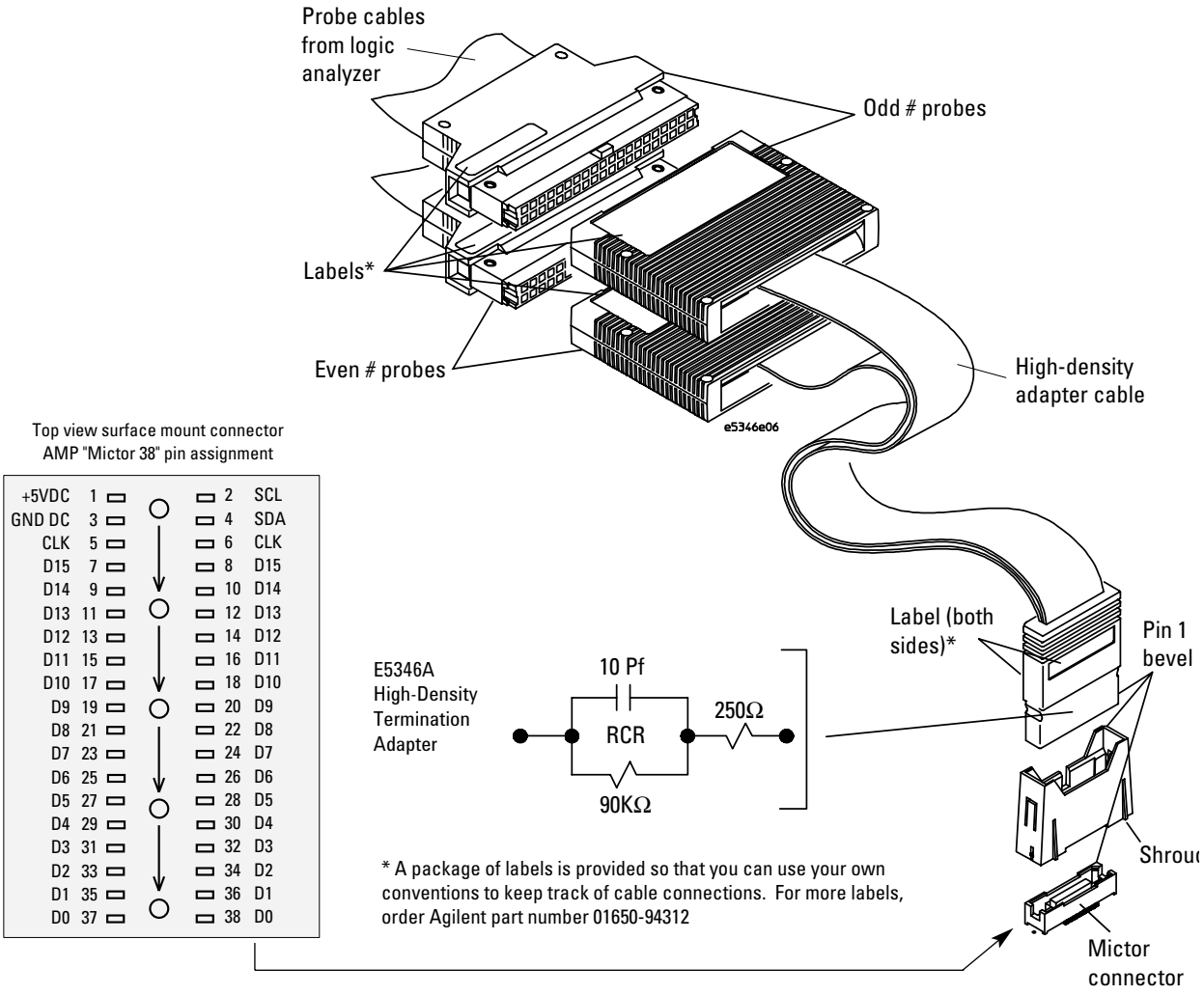

Figure 2. E5346A High-Density Termination Adapter

Termination for logic analysis is included at the probe tip of the E5346A high-density termination adapter for easy application and use. A schematic of this termination is shown in figure 3.

The AMP Mictor connector must be placed close enough to the target system so that the stub length created is less than 1/5 the Tr (bus rise-time). For PC board material (er=4.9) and Zo in the range of 50-80Ω, use a propagation delay of 160 ps/inch of stub.

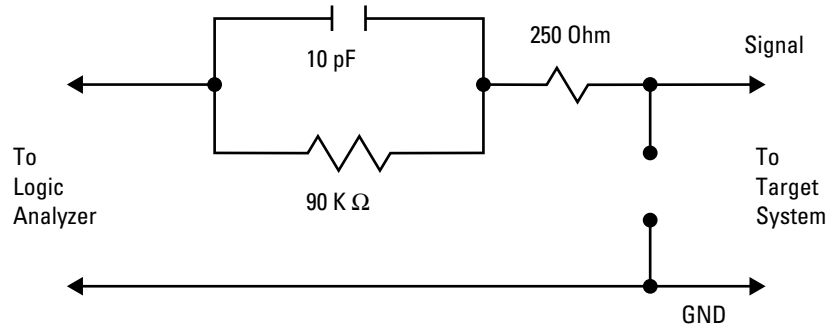

Figure 3. RC Network for Signal Termination

Four E5346A adapters and Mictor connectors are needed to probe all the required signals for inverse assembly.

Mictor Connector Placement

Placing the AMP Mictor connectors as close as possible to the signal source will minimize stub length and ensure a reliable measurement. Figure 4 shows the connector layout of J1-J5. J1-J4 are required for inverse assembly. J5 is optional for timing or state analysis of I/O ports.

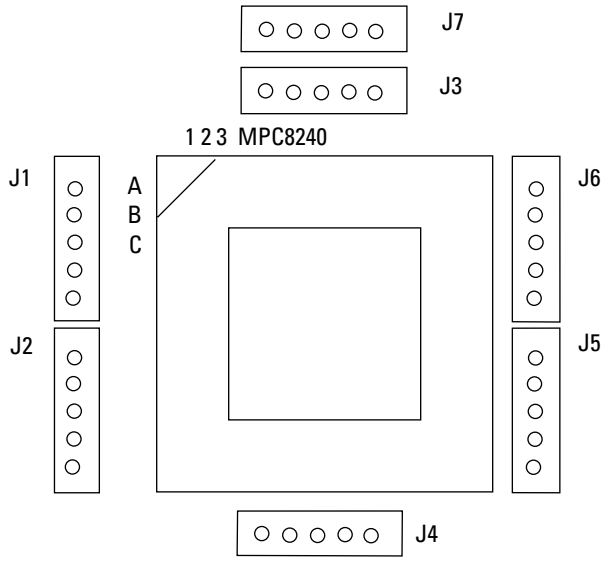

Figure 4. Mictor Connector Placement

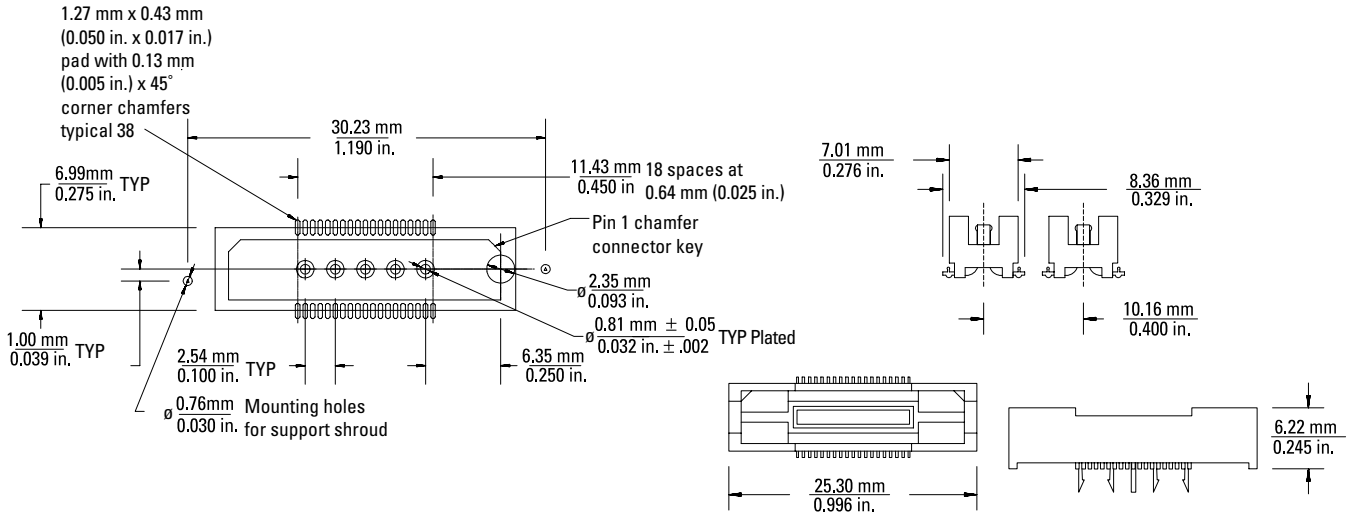

Figure 5. AMP Mictor Connector Dimensions

Mictor Connector

The AMP Mictor connectors are available from AMP (PN 2-767004-2) or from (PN E5346-68701). The Mictor kit contains five AMP Mictor connectors and five support shrouds. The signals +5 VDC, SCL, and SDA are not used for probing and should not be connected to the target system, as shown in figure 2.

Support Shroud

A support shroud (E5346-44701) is recommended to provide additional strain relief between the E5346A adapter and the AMP Mictor connector, as shown in figure 6. The shroud fits around the AMP Mictor connector and requires two through-hole connections to the target board. Five shrouds are included with five AMP Mictor connectors in the E5346-68701 kit.

Inverse Assembler

An inverse assembler translates logic levels captured by the logic analyzer into MPC8240 mnemonics and identifies the microprocessor bus cycles captured, such as memory read/write, interrupt acknowledge, or I/O read/write.

For better visibility of the external bus, the instruction cache should be disabled. If the instruction cache is enabled, many instructions are executed from the cache and do not appear on the external bus.

Source Correlation Tool Set

The inverse assembler can be used with the B4620B source correlation tool set. This allows you to time-correlate an acquired trace to written code. The source correlation tool set uses the information provided in your object file to build a database of source files, line numbers and symbol information.

IEEE 695, Elf/Dwarf, and ASCII symbol files are supported.

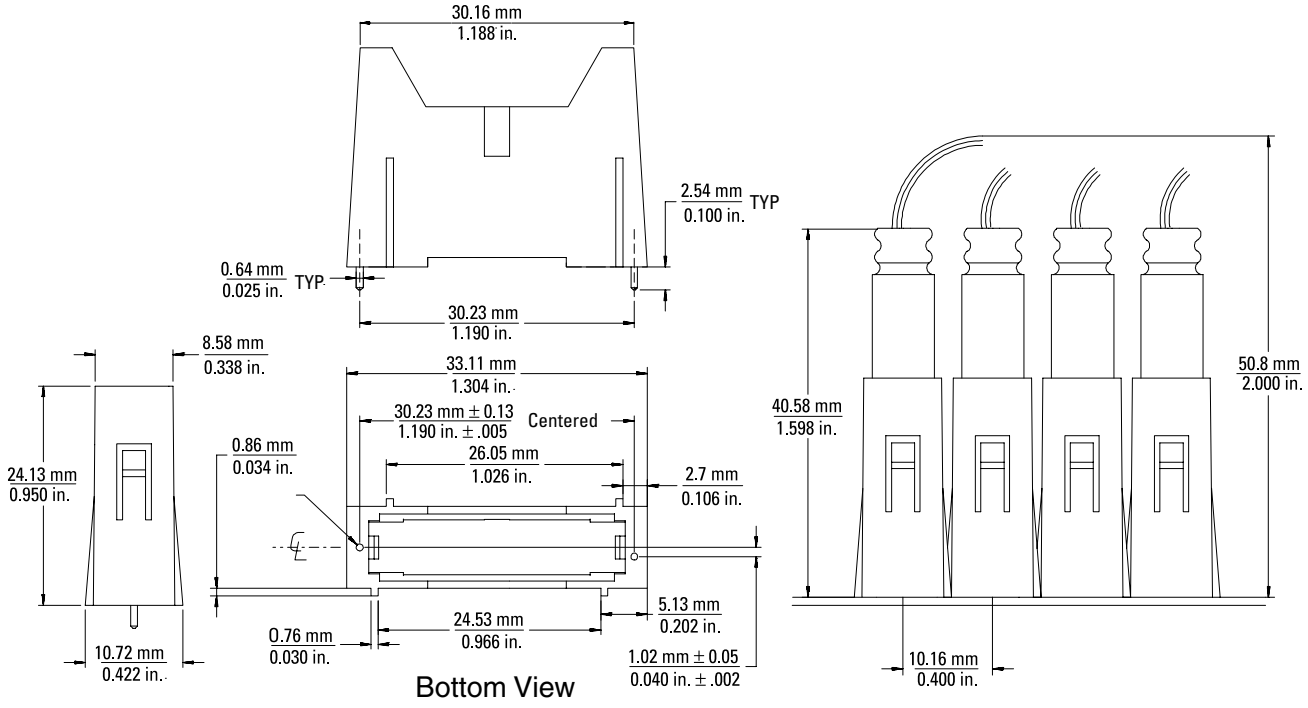

Figure 6. Support Shroud Dimensions

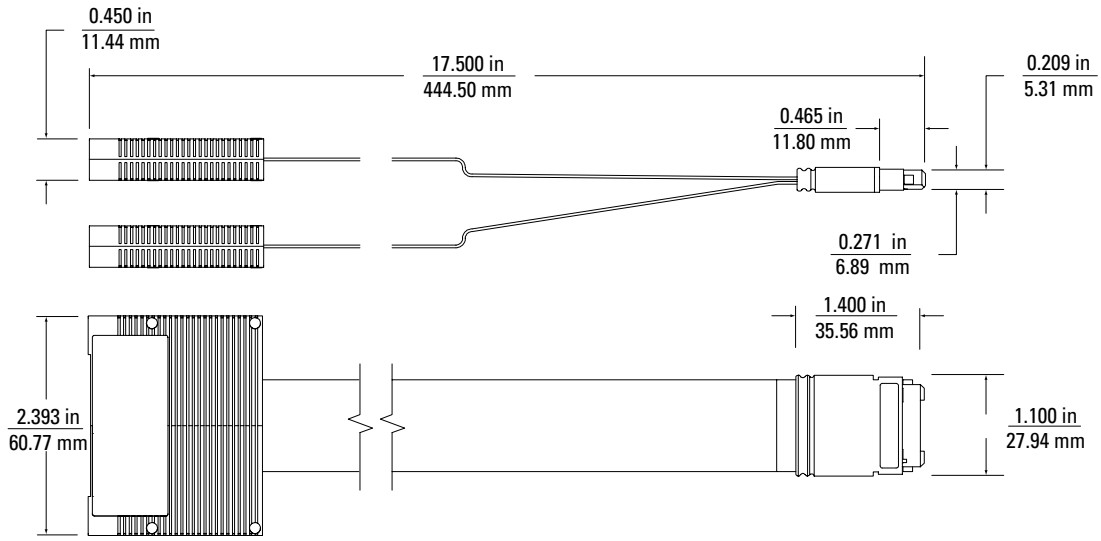

Figure 7. High-Density Termination Adapter Cable Dimensions

Pinout Information on Required Signals for Inverse Assembly

This table describes the connections for the four Mictor 38 connectors necessary for compatibility with the inverse assembler and the E5346A high-density termination adapter cables. This is intended to be a guide for placing probing connectors on a target system.

J1-J4 are required for full inverse assembly and if no data visibility is required, J1-J2 need to be connected for code-flow only.

Mictor Conn. #	AMP Mictor Pin#	Signal Name	Mictor Conn. #	AMP Mictor Pin #	Signal Name
J1 (odd)	38	SDMA[12]	J1 [even]	37	Debug_Addr[13] /FTP[3]
	36	SDMA[11]		35	Debug_Addr[12] /PCI_CLK[4]
	34	SDMA[10]		33	Debug_Addr[11] /REQ[4]
	32	SDMA[9]		31	Debug_Addr[10] /GNT[4]
	30	SDMA[8]		29	Debug_Addr[9] /PLL_CFG[4]
	28	SDMA[7]		27	Debug_Addr[8] /PLL_CFG[3]
	26	SDMA[6]		25	Debug_Addr[7] /PLL_CFG[2]
	24	SDMA[5]		23	Debug_Addr[6] /PLL_CFG[1]
	22	SDMA[4]		21	Debug_Addr[5] /PLL_CFG[0]
	20	SDMA[3]		19	Debug_Addr[4] /FTP[2]
	18	SDMA[2]		17	Debug_Addr[3] /FTP[1]
	16	SDMA[1]		15	Debug_Addr[2] /FTP[0]
	14	SDMA0/SDBA1		13	Debug_Addr[1] /MTP[1]
	12	SDBA0		11	Debug_Addr[0] /MTP[0]
	10	Debug_Addr[15]/#QACK		9	CKE
	8	Debug_Addr[14]/CKO		7	RTC
	6	SDRAM_CLK[0]		5	#MIV

Mictor	AMP Mictor	Signal Name	Mictor	AMP Mictor	Signal Name

Conn. #	Pin#		Conn. #	Pin #	
J2 (odd)	38	MAA[2]	J2 (even)	37	CAS/#DQM[7]
	36	MAA[1]		35	CAS/#DQM[6]
	34	MAA[0]		33	CAS/#DQM[5]
	32	#RCS1		31	CAS/#DQM[4]
	30	#RCS0		29	CAS/#DQM[3]
	28	RAS/#CS[7]		27	CAS/#DQM[2]
	26	RAS/#CS[6]		25	CAS/#DQM[1]
	24	RAS/#CS[5]		23	CAS/#DQM[0]
	22	RAS/#CS[4]		21	PAR/AR[7]
	20	RAS/#CS[3]		19	PAR/AR[6]
	18	RAS/#CS[2]		17	PAR/AR[5]
	16	RAS/#CS[1]		15	PAR/AR[4]
	14	RAS/#CS[0]		13	PAR/AR[3]
	12	#AS		11	PAR/AR[2]
	10	#WE		9	PAR/AR[1]
	8	#FOE		7	PAR/AR[0]
	6	#SDRAS		5	#SDCAS

Mictor Conn. #	AMP Mictor Pin#	Signal Name	Mictor Conn. #	AMP Mictor Pin #	Signal Name
J3 (odd)	38	DH[31]	J3 (even)	37	DL[31](LSB)
	36	DH[30]		35	DL[30]
	34	DH[29]		33	DL[29]
	32	DH[28]		31	DL[28]
	30	DH[27]		29	DL[27]
	28	DH[26]		27	DL[26]
	26	DH[25]		25	DL[25]
	24	DH[24]		23	DL[24]
	22	DH[23]		21	DL[23]
	20	DH[22]		19	DL[22]
	18	DH[21]		17	DL[21]
	16	DH[20]		15	DL[20]
	14	DH[19]		13	DL[19]
	12	DH[18]		11	DL[18]
	10	DH[17]		9	DL[17]
	8	DH[16]		7	DL[16]
	6			5	

Mictor Conn. #	AMP Mictor Pin#	Signal Name	Mictor Conn. #	AMP Mictor Pin #	Signal Name
J4 (odd)	38	DH[15]	J4 (even)	37	DL[15]
	36	DH[14]		35	DL[14]
	34	DH[13]		33	DL[13]
	32	DH[12]		31	DL[12]
	30	DH[11]		29	DL[11]
	28	DH[10]		27	DL[10]
	26	DH[9]		25	DL[9]
	24	DH[8]		23	DL[8]
	22	DH[7]		21	DL[7]
	20	DH[6]		19	DL[6]
	18	DH[5]		17	DL[5]
	16	DH[4]		15	DL[4]
	14	DH[3		13	DL[3]
	12	DH[2		11	DL[2
	10	DH[1]		9	DL[1]
	8	DH[0] (MSB)		7	DL[0]
	6			5	

Mictor Conn. #	AMP Mictor Pin#	Signal Name	Mictor Conn. #	AMP Mictor Pin #	Signal Name
J5 (odd)	38	PAR	J5 (even)	37	
	36	#SERR		35	
	34	#PERR		33	IDSEL
	32	#LOCK		31	#GNT[0]
	30	#STOP		29	#REQ[0]
	28	#DEVSEL		27	
	26	C/#BE[0]		25	GND
	24	C/#BE[1]		23	#IRDY
	22	C/#BE[2]		21	#FRAME
	20	C/#BE[3]		19	#TRDY
	18			17	#GNT[1]
	16	#INTA		15	#REQ[1]
	14			13	PMAA[2]
	12			11	PMAA[1]
	10			9	PMAA[0]
	8			7	
	6	PCI_CLK[0]		5	

Mictor Conn. #	AMP Mictor Pin#	Signal Name	Mictor Conn. #	AMP Mictor Pin #	Signal Name
J6 (odd)	38	AD[0](LSB)	J6 (even)	37	AD[16]
	36	AD[1]		35	AD[17]
	34	AD[2]		33	AD[18]
	32	AD[3]		31	AD[19]
	30	AD[4]		29	AD[20]
	28	AD[5]		27	AD[21]
	26	AD[6]		25	AD[22]
	24	AD[7]		23	AD[23]
	22	AD[8]		21	AD[24]
	20	AD[9]		19	AD[25]
	18	AD[10]		17	AD[26]
	16	AD[11]		15	AD[27]
	14	AD[12]		13	AD[28]
	12	AD[13		11	AD[29]
	10	AD[14]		9	AD[30]
	8	AD[15]		7	AD[31] (MSB)
	6			5	

Mictor Conn. #	AMP Mictor Pin#	Signal Name	Mictor Conn. #	AMP Mictor Pin #	Signal Name
J7 (odd)	38	CHKSTOP_IN	J7 (even)	37	#SMI
	36	SCL		35	NMI
	34	SDA		33	#MCP
	32	IRQ4/LINT		31	#HRST_CPU
	30	IRQ3/#S_FRAME		29	#HRST_CTRL
	28	IRQ2/S_RST		27	
	26	IRQ1/S_CLK		25	
	24	IRQ0/S_INT		23	
	22	#TRST		21	
	20	TMS		19	
	18	TDO		17	
	16	TDI		15	
	14	TCK		13	
	12	TBEN		11	
	10	#SUSPEND		9	
	8	#SRESET		7	
	6			5	

Related Literature	Pub. Number
E5346A and E5351A High-Density Adapters, Product Overview	5965-5475E
Minimizing Intrusion Effects when Probing with a Logic Analyzer, Application Note	5962-8620E
Probing Solutions for Logic Analysis Systems	5968-4632E

Product Ordering Information

E5346A	High-Density Termination Adapter
E5346-68701	Kit of Five Mictor Connectors and Five Support Shrouds
E5346-63201	High-Density Right Angle Adapter
E5346-44701	High-Density Termination Adapter Support Shroud
E9611A Opt. #001	Motorola MPC8240 Inverse Assembler
B4620B	Source Correlation Tool Set
AMP PN 2-767004-2	AMP Mictor Connector (order from AMP)

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Taiwan:
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(fax) 0800 286 331

Other Asia Pacific Countries:
(tel) (65) 6375 8100
(fax) (65) 6755 0042
Email: tm_ap@agilent.com

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