Application Note

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Nexus Interface Connector Options for MPC56x Devices

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The Nexus interface is a new industry standard that crosses CPU boundaries and allows industry-standard tools to support multiple CPU architectures. It allows advanced debug capabilities by providing high-speed access to the microcontroller core. These advanced debug capabilities include trace, without requiring extensive external circuitry to monitor an external address bus. A Nexus-compliant class 2 or greater device allows non-intrusive trace on a microcontroller in single-chip mode or a microcontroller without external data and address buses.

An IEEE-ISTO 5001™-1999 [1] Nexus Class 3 interface is included on the MPC56x family of microcontrollers. The Nexus standard, as implemented on the MPC56x, is referred to as the Real-time Embedded Application Development Interface (READI).

This application note addresses connector options for the MPC561, the MPC563, and the MPC565 and replaces *MPC565/MPC566 Nexus Interface Connector Options* (AN2002).

1 Nexus Connector Options

The 5001-Nexus standard defines several different standards for different speed accesses to a microcontroller in a target system. These standards have been revised since that release. The new connectors come in both a robust and a non-robust configuration. In addition, each connector has 2 definitions depending upon whether the connection is an Auxiliary only (Auxiliary In and Auxiliary Out) connection or a JTAG IEEE 1149.1 port with an Auxiliary Output port.

NOTE

The MPC56x parts do not support the JTAG IEEE 1149.1 configuration.

1.1 Non-Robust Connectors

The Nexus connectors are available in several pin counts from the low-end connector A (26 pins) to the high-end connector D (80 pins), which includes a port replacement for the Nexus port microcontroller signals. In addition, the new standard also defines a 40-pin connector B

[1] Nexus 5001-1999 (Version 1.0) is the current release of the standard. This application note describes connectors that have been approved by the Nexus Consortium Hardware Technical subcommittee, but have not yet been included in a new released version of the standard.

and a 50-pin connector C, both of which feature IEEE 1149.1 and Auxiliary port options. See Table 1 for a listing of the possible Nexus connectors.

Table 1. Nexus Connector Options

Non-Robust			Robust			Comments
Connector Option [1]	Number of pins	AMP, System 50 Connector Part Number	Connector Option[1]	Number of pins	Glenair Connector Part Number	
A1	26	1-104068-2	A1R	25	MR7580-25P2 BNU	Minimum Combined IEEE 1149.1/Auxiliary Out Nexus Configuration JTAG
A2	26	1-104068-2	A2R	25	MR7580-25P2 BNU	Minimum Auxiliary Port Nexus Configuration
B1	40	104549-6	B1R	37	MR7580-37P2 BNU	Combined IEEE 1149.1/Auxiliary Out Configuration
B2	40	104549-6	B2R	37	MR7580-37P2 BNU	Auxiliary Port Option Typical Reduced-Port MPC56x Configuration
C1	50	104549-7	C1R	51	MR7580-51P2 BNU	Combined IEEE 1149.1 and Auxiliary Configuration
C2	50	104549-7	C2R	51	MR7580-51P2 BNU	Auxiliary Port Option **Recommended MPC56x Configuration (Full-Port Mode)**
D [2]	TBD	TBD	TBD	TBD	—	Maximum Nexus Port Configuration with Port Replacement [3]

1 The connector option is determined by the combination of the connector and port. For example, connector A1 is the connector A, combined JTAG/Auxiliary Out non-robust option. The robust option is A1R.
2 To be determined; connector D pin definitions have not been defined at this time.
3 Port replacement is not supported on the MPC56x family of devices.

The non-robust connectors are used in evaluation boards and other systems that are not exposed to extreme environments. These are common, low-cost, 2-row connectors that are available from several manufacturers. The AMP System 50 part numbers are listed in Table 1.

1.2 Robust Connectors

The lowest pin-count robust connector is a 25-pin Nexus connector A. The high-end robust Nexus connector D has 100 pins. The Nexus connector B has 37 pins, and the Nexus connector C has 51 pins. These connectors are further described in Table 1.

The robust connectors are designed to be used in harsh environments such as under the hood of an automobile. The robust connectors listed in Table 1 are manufactured by Glenair and feature TwistPin connections for highly reliable contact under all conditions in a Micro-D configuration. Figure 1 is an illustration of a typical sub-D configuration and a close-up of the TwistPin.

Figure 1. Details of the Glenair Micro-D TwistPin Connectors (See Section 6, “References” for more details.)

2 MPC56x Nexus Connector Options

The MPC56x devices support four of the Nexus connectors: connector B option 2 (B2), connector B option 2 robust (B2R), connector C option 2 (C2), and connector C option 2 robust (C2R). The recommended interface is the 50-pin full-port (and high-speed) C2 configuration. For extreme environments, use the connector C option 2 robust (C2R) connector.

2.1 MPC56x Full-Port Configuration

In its maximum configuration, the MPC56x supports eight message data outputs and two message data inputs. This provides a maximum throughput of debug information to and from the Nexus tool. For specific signals used by the MPC565 and the MPC561/MPC563, see Section 3, “MPC56x Nexus Signals.” The full-port mode allows transfers from the microcontroller at up to 56 Mbytes (448 Mbits) per second (56-MHz system clock speed x the 8-bit data output port). Messages into the microcontroller can be transmitted at up to 56 Mbits per second (one-half the 56-MHz system clock x the 2-bit data input port). Table 2 shows the MPC56x signals and the Nexus Auxiliary signals for the 50-pin Nexus auxiliary port connector C2 (non-robust). The non-robust connector is a 2-row, 0.1 mil spacing connection. The pinout for the MPC56x is shown in Table 2.

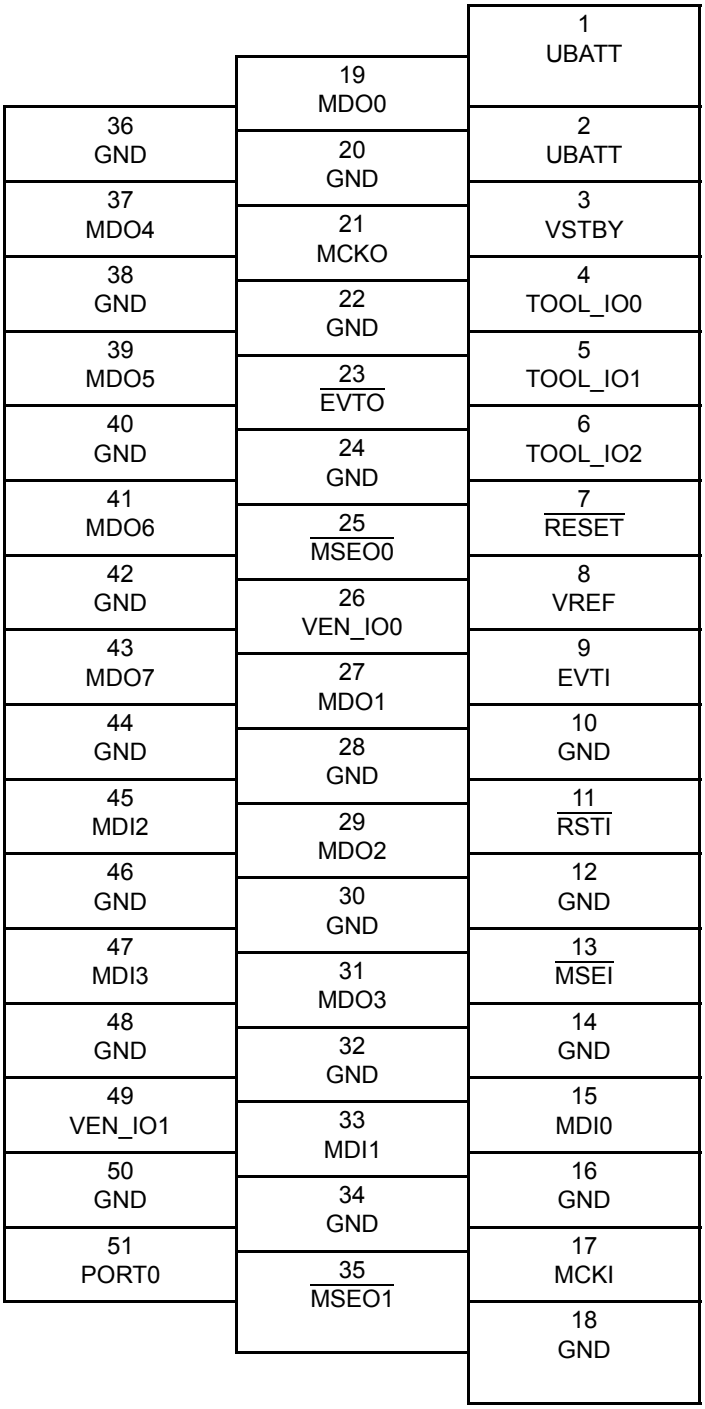
Table 2. MPC56x Nexus 50-Pin Definition (Full-Port Mode)

MPC56x Signal	Nexus Auxiliary Signal	I/O	Pin Number	Pin Number	I/O	Nexus Auxiliary Signal	MPC56x Signal
—	UBATT	OUT	1	2	OUT	UBATT	—
VSTBY2.6	VSTBY	OUT	3	4	IN or OUT	TOOL_IO0	—
—	TOOL_IO1	IN or OUT	5	6	IN or OUT	TOOL_IO2	—
$\overline{\text{HRESET}}$	/RESET [1]	IN [2]	7	8	OUT	VREF	VDD2.6
$\overline{\text{EVTI}}$	/EVTI	IN[2]	9	10	—	GND	GND
$\overline{\text{RSTI}}$	/RSTI	IN[2]	11	12		GND	GND
$\overline{\text{MSEI}}$	/MSEI	IN[2]	13	14	—	GND	GND
MDI[0]	MDI0	IN[2]	15	16	—	GND	GND
MCKI	MCKI	IN[2]	17	18	—	GND	GND
MDO[0]	MDO0	OUT	19	20	—	GND	GND
MCKO	MCKO	OUT	21	22	—	GND	GND
LWP[1]	/EVTO	OUT	23	24	—	GND	GND
$\overline{\text{MSEO}}$	/MSEO0	OUT	25	26	IN or OUT	VENDOR_IO0	LWP[0]
MDO[1]	MDO1	OUT	27	28	—	GND	GND
MDO[2]	MDO2	OUT	29	30	—	GND	GND
MDO[3]	MDO3	OUT	31	32	—	GND	GND
MDI[1]	MDI1	IN[2]	33	34	—	GND	GND
—	/MSEO1	OUT	35	36	—	GND	GND
MDO[4]	MDO4	OUT	37	38	—	GND	GND
MDO[5]	MDO5	OUT	39	40	—	GND	GND
MDO[6]	MDO6	OUT	41	42	—	GND	GND
MDO[7]	MDO7	OUT	43	44	—	GND	GND
— [3]	MDI2	IN[2]	45	46	—	GND	GND
— [3]	MDI3	IN[2]	47	48	—	GND	GND
EPEE & B0EPEE [4]	VENDOR_IO1	IN or OUT	49	50	—	GND	GND

1 The Nexus specification labels active low signals with a forward slash (/) before the signal name.
2 The Nexus standard recommends that inputs should have 10K Ω pull-up resistors to VREF (2.6 volts). Exception: The RSTI input should have a 10K Ω pull-down resistor. This is in line with the proposed new standard.
3 These optional signals are not used in reduced port configuration on the MPC56x devices.
4 This signal is needed only if control of EPEE or B0EPEE is required by the Nexus tool.

For the MPC56x devices, the robust connector is a 3-row, sub-D type connector. Table 3 shows the signal names for the Nexus Auxiliary Port connector C2R (51-pin).

Table 3. MPC56x Nexus 51-Pin Robust Connector



2.2 MPC56x Minimum Configuration

In the reduced-port configuration, the MPC56x supports two message data outputs and one message data input. See Table 4 and Section 3, “MPC56x Nexus Signals,” for the mapping of these signals to the MPC565 and the MPC561/MPC563. In the reduced-port configuration, data can be transmitted out of the MPC56x at 112 Mbits per second (14 Mbytes per second) at a 56-MHz system clock. Data from the Nexus tool to the

MPC56x can be transmitted at up to 26 Mbits per second (at a 56-MHz system clock). Table 4 shows the MPC56x signals mapped into the Nexus Auxiliary Port B2. In addition, for the reduced port mode, the 50-pin connector (see Table 2) can be used if the extra signals (MDI[1] and MDO[2:7]) are ignored.

NOTE

This 40-pin option has a different pinout than the 40-pin connector used on early Freescale/Axiom Manufacturing MPC565 and MPC561/MPC563 Evaluation Boards. See Appendix A, "MPC56x Initial EVB Nexus Connectors."

Table 4. MPC56x Nexus 40-Pin Definition (Reduced-Port Mode)

MPC56x Signal	Nexus Auxiliary Signal	I/O	Pin Number	Pin Number	I/O	Nexus Auxiliary Signal	MPC56x Signal
—	UBATT	OUT	1	2	OUT	UBATT	
VSTBY2.6	VSTBY	OUT	3	4	IN or OUT	TOOL_IO0	—[2]
—[2]	TOOL_IO1	IN or OUT	5	6	IN or OUT	TOOL_IO2	—[2]
$\overline{\text{HRESET}}$	/RESET	IN[1]	7	8	—	VREF	VCC2.6
$\overline{\text{EVTI}}$	/EVTI	IN[1]	9	10	—	GND	GND
$\overline{\text{RSTI}}$	/RSTI	IN[1]	11	12	—	GND	GND
$\overline{\text{MSEI}}$	/MSEI	IN[1]	13	14	—	GND	GND
MDI[0]	MDI0	IN[1]	15	16	—	GND	GND
MCKI	MCKI	IN[1]	17	18	—	GND	GND
MDO[0]	MDO0	OUT	19	20	—	GND	GND
MCKO	MCKO	OUT	21	22	IN[1] or OUT	GND	GND
LWP[1]	/EVTO	OUT	23	24	—	GND	GND
$\overline{\text{MSEO}}$	/MSEO0	OUT	25	26	—	VENDOR_IO0	LWP[0]
MDO[1]	MDO1	OUT	27	28	—	GND	GND
—[2]	MDO2	OUT	29	30	—	GND	GND
—[2]	MDO3	OUT	31	32	—	GND	GND
—[2]	MDI1	IN[1]	33	34	—	GND	GND
—[2]	/MSEO1	OUT	35	36	—	GND	GND
—[2]	MDO4	OUT	37	38	—	GND	GND
—[2]	MDO5	OUT	39	40	—	GND	GND

1 The Nexus standard recommends that inputs should have 10K Ω pull-up resistors to VREF (2.6 volts). Exception: the $\overline{\text{RSTI}}$ input should have a 10K Ω pull-down resistor. This is in line with the proposed new standard.

2 These optional signals are not used in reduced port configuration on the MPC56x devices.

3 MPC56x Nexus Signals

On the MPC56x devices, some of the Nexus signals are shared with other pin functions. The shared functions of the MPC565 are different from the MPC561/MPC563. Table 5 shows the Nexus signal versus the MPC565 and MPC561/MPC563 pins. See Table 6 for signal descriptions.

Table 5. MPC56x Signal Sharing

Nexus Signal		MPC565		MPC561/MPC563	
		Signal	Ball	Signal	Ball
	/RESET	$\overline{\text{HRESET}}$	AB23	HRESET	W23
	/RSTI	$\overline{\text{RSTI}}$	M3	JCOMP/$\overline{\text{RSTI}}$	L1
Aux In Port	MCKI	MCKI	L4	TCK/DSCK/MCKI	L2
	/MSEI	$\overline{\text{MSEI}}$	M4	VF[2]/MPIO32B[2]/ MSEI	M24
	MDI0	MDI[0]	L1	TDI/DSDI/MDI0	M1
	MDI1	MDI[1]	L3	MPWM0/MDI1	F26
	MDI2	—[1]	—	—[1]	—
	MDI3	—[1]	—	—[1]	—
	/EVTI	$\overline{\text{EVTI}}$	M2	TMS/$\overline{\text{EVTI}}$	M2
Aux Out Port	MCKO	MCKO	P3	VF[1]/MPIO32B[1]/ MCKO	L24
	/MSEO	$\overline{\text{MSEO}}$	T2	VFLS[0]/MPIOB32[3]/ $\overline{\text{MSEO}}$	M25
	MDO0	MDO[0]	P4	TDO/DSDO/MDO[0]	M4
	MDO1	MDO[1]	R1	VF[0]/MPIO32B[0]/ MDO[1]	L23
	MDO2	MDO[2]	R3	MPWM[1]/MDO[2]	G23
	MDO3	MDO[3]	T1	MPWM[17]/MDO[3]	H23
	MDO4	MDO[4]/ MPIO32B[10]	N2	IRQ[0]/SGPIO[0]/ MDO[4]	P3
	MDO5	MDO[5]/ MPIO32B[9]	N4	MPIO32B[5]/MDO[5]	H26
	MDO6	MDO[6]/ MPIO32B[8]	N3	MPIO32B[6]/ MPWM[4]/MDO[6] [2]	J23
	MDO7	MDO[7]/ MPIO32B[7]	P1	MPWM[19]/MDO[7]	H25
	/EVTO	$\overline{\text{BG}}$/VF[0]/LWP[1]	AF14	$\overline{\text{BG}}$/VF[0]/LWP[1]	R3
Port	PORT0	—[1]	—	—[1]	—

Table 5. MPC56x Signal Sharing (continued)

Nexus Signal		MPC565		MPC561/MPC563	
		Signal	Ball	Signal	Ball
Vendor Defined	VENDOR_IO0	SGPIOC[7]/ IRQOUT/LWP[0]	AC14	SGPIOC[7]/IRQOUT/ LWP[0]	R1
	VENDOR_IO1	EPEE & B0EPEE [3]	AF21 & AD20	EPEE & B0EPEE[3]	T23 & T24
Tool Defined	TOOL_IO0	— [4]	—	—	—
	TOOL_IO1	—[4]	—	—	—
	TOOL_IO2	—[4]	—	—	—
	VREF	VDD2.6	VDD	VDD2.6	VDD
	VALTREF	VSTBY2.6	— [5]	VSTBY	VSTBY2.6 [6]

1 This optional signal is not available on the MPC56x devices.
2 Pin MPWM[18]/MDO[6] (H24) could also be used, but is not enabled at reset and must be enabled via software. Using the MPWM[18]/MDO[6] for the MDO6 function is not recommended and is not supported by tool vendors.
3 This signal is needed only if control of EPEE or B0EPEE is required by the Nexus tool.
4 This optional signal is defined for use by tool vendors and has no defined connection to the MPC56x device.
5 This signal depends on the following system requirements: KAPWR (Y26), VDDSRAM1 (E3), VDDSRAM2 (D2), or VDDSRAM3 (G4). This pin should be connected to the standby supply used in a particular system.
6 This should be a 2.6-volt supply and not the IRAMSTBY current source.

Table 6. MPC56x Nexus Signal Description

Signal Name		Nexus Signal Name & Description
MPC565	MPC561/MPC563	
HRESET	HRESET	**Nexus reset** (/RESET). Resets the MPC56x microcontroller.
EVTI	TMS/EVTI	**Nexus event in** (/EVTI). Level sensitive when configured for breakpoint generation.
RSTI	JCOMP/RSTI	**Nexus reset input** (/RSTI). Resets the READI port and is used to reconfigure the Nexus port. /RSTI should be pulled down by a 10K Ω resistor (for normal applications) to hold an unused Nexus port in reset and driven high to enable the Nexus port.
MSEI	VF[2]/MPIO32B[2]/MSEI	**Message start/end input** (/MSEI). Indicates when a message has started on the MDI pins. /MSEI signals both the end of a packet within a message as well as the end of the message.
MCKI	TCK/DSCK/MCKI [1]	**Message clock input** (MCKI). Should be one-half of the system clock frequency and synchronous to the MCKO.
MDI[0] MDI[1]	TDI/DSDI/MDI[0] MPWM[0]/MDI[1]	**Message data input** (MDI). Provide data input. In the reduced-port configuration, only the MDI[0] signal is used.

Table 6. MPC56x Nexus Signal Description (continued)

Signal Name		Nexus Signal Name & Description
MPC565	**MPC561/MPC563**	
$\overline{BG}$/VF[0]/LWP[1]	$\overline{BG}$/VF[0]/LWP[1]	**Nexus event out** (/EVTO). Indicates that the processor has halted in response to an /EVTI signal. On the MPC56x, /EVTO can be connected to the MPC56x RCPU L-Bus Watchpoint signal 1 to indicate when the RCPU has reached an L-bus Watchpoint.
$\overline{MSEO}$	VFLS[0]/MPIO32B[1]/$\overline{MSEO}$	**Message start/end output** (/MSEO). Indicates when an MDO signal has started and when an MDO packet has ended.
MCKO	VF[1]/MPIO32B[1]/MCKO	**Nexus message clock output** (MCKO). Provides timing for the MDO and /MSEO signals. The frequency of this clock is the same as the MPC56x operating system frequency.
MDO[0] MDO[1] MDO[2] MDO[3]	TDO/DSDO/MDO[0] VF[0]/MPIO32B[0]/MDO[1] MPWM[1]/MDO[2] MPWM[17]/MDO[3]	**Message data output signals 0-3** (MDO[0:3]). In the reduced-port configuration, only MDO[0:1] are used. The full-port configuration uses MDO[0:7].
MDO[4]/MPIO[7] MDO[5]/MPIO[8] MDO[6]/MPIO[9] MDO[7]/MPIO[10]	IRQ[0]/SGPIOC[0]/MDO[4] MPIO32B[5]/MDO[5] MPIO32B[6]/MPWM[4]/MDO[6] MPWM[19]/MDO[7]	**Message data output signals 4-7**(MDO[4:7]). In the reduced-port configuration, these pins are not used. In full-port configuration, they provide an 8-bit output port to the Nexus tool. On the MPC565, these pins are shared with the MIOS14 General-Purpose Parallel Port. On the MPC561 and MPC563, some are shared with MIOS14 PWM channels and with Interrupt 0. The Nexus pins are automatically selected if the READI module is enabled and configured for the full-port mode.
SGPIOC[7]/$\overline{IRQOUT}$/LWP[0]	SGPIOC[7]/$\overline{IRQOUT}$/LWP[0]	**Nexus Vendor_IO0** (VENDOR_IO0). Used as the MPC56x RCPU L-bus Watchpoint signal 0.
EPEE & B0EPEE	EPEE & B0EPEE	**Nexus Vendor_IO1** (VENDOR_IO1). Enables programming of the MPC56x's internal Flash. This signal can be used to drive EPEE or B0EPEE if control of the internal Flash is desired by the Nexus tool. EPEE is the internal Flash enable and B0EPEE is the block 0 Flash erase enable. It allows the tool to enable (or disable) internal Flash programming.
VDD2.6	VDD2.6	**Nexus VREF** (VREF). Provides a reference for the signal levels of the Nexus device. All input high and low voltages should be referenced to this pin. The Nexus specification defines the input voltages as VIL = 0.3xVREF and VIH = 0.7xVREF. For the MPC56x, this pin should be approximately 2.6 volts. (All signals in and out of the MPC56x are 2.6 volt signals.)

Table 6. MPC56x Nexus Signal Description (continued)

Signal Name		Nexus Signal Name & Description
MPC565	**MPC561/MPC563**	
VSTBY2.6	VSTBY2.6	**Nexus VALTREF** (VALTREF). Provides a backup power supply for the MPC56x's SRAM. This pin is monitored by the Nexus tool to determine if power is lost to the standby supply of the system.
GND	GND	**Ground**. Ground reference point for the Nexus connectors. Many ground signals are included to provide shielding for the high-speed Nexus signals.
—	—	**Tool_IO pins** (TOOL_IO[1:3]). Designated for Nexus tool use. At this time, there are no defined connections from these pins to the MPC56x device. They may be used for communication between multiple tools on the Nexus connector.
UBATT	UBATT	**Battery/unregulated module voltage**. This voltage (nominally 12 volts) should be made available to power external circuitry needed for extending the Nexus connection to the tool. It should have reverse-bias protection.

1 Care should be taken in routing the TCK/DSCK/MCKI signal if it is used for more than the MCKI function (i.e. if the DSCK or TCK signals are optionally used for BDM or JTAG boundary scan). Proper termination may be needed to eliminate board reflections. The Nexus connector should be physically mounted near the MPC561/MPC563 to reduce the trace length.

4 MPC56x READI Port Configuration

4.1 Enabling the MPC56x READI Port

The READI port on the MPC565 is enabled on the rising edge of $\overline{\text{RSTI}}$ only if $\overline{\text{EVTI}}$ is asserted (driven low). The same sequence is needed on the MPC561 and the MPC563, but the MPC561 and MPC563 can only be enabled after $\overline{\text{PORESET}}$ has been negated. In order to trace out of reset, the $\overline{\text{HRESET}}$ should be asserted by the tool until the READI port has been enabled and configured.

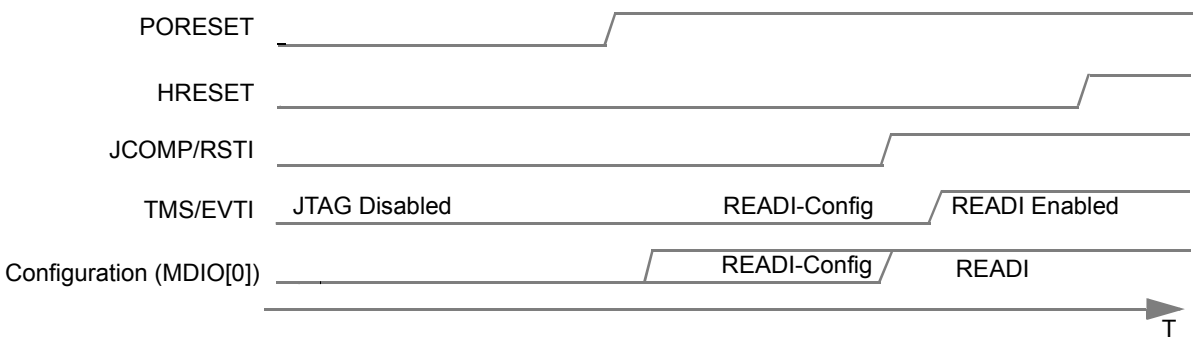


Figure 2. READI Mode Selection

The selection of reduced-port configuration or full-port configuration is determined by the state of MDI[0] upon the negation of $\overline{\text{RSTI}}$. Note that $\overline{\text{EVTI}}$ and MDI[0] must be valid for at least 4 clocks prior to the rising edge of $\overline{\text{RSTI}}$. $\overline{\text{RSTI}}$ has an internal pull-down resistor that must be overcome to enable the READI Nexus module.

Table 7. MPC565 READI Configuration Options

$\overline{\text{EVTI}}$	MDI[0]	Configuration
1	X	READI module disabled. All outputs are tri-stated
0	1	READI module enabled. Default Port Configuration —2 MDI and 8 MDO.
0	0	READI module enabled. Reduced-Port Configuration—1 MDI and 2 MDO.

5 Special Considerations for the MPC561/MPC563

The MPC561 and MPC563 have special board considerations due to the configuration of the internal pull resisters. The IEEE-ISTO 5001-1999 Nexus standard specifies that inputs should have 10K Ω pull ups. The intent of this specification is to insure that inputs are not floating when no tool is connected. Many of the MPC561 and MPC563 inputs signals have internal weak pull down devices or have pull devices controlled by the PULL_SEL pin that can be configured as pull up or pull down devices. In general, these weak devices should be augmented with an external resistor to insure the state of the pin, since the pull downs can be disabled with software.

Table 8. MPC561 and MPC563 Input Pull Devices

Signal Name	Pull Device
TMS/$\overline{\text{EVTI}}$	Pull Down until SPRDS is set if Nexus is enabled
JCOMP/$\overline{\text{RSTI}}$	Pull Down until SPRDS is set
VF[2]/MPIO32B[2]/$\overline{\text{MSEI}}$	Pull Device enabled until PULL_DIS[0] is set [1]
TCK/DSCK/MCKI	Pull Down until reset negates
TDI/DSDI/MDI[0]	Pull Down until reset negates
MPWM[0]/MDI[1]	Pull Device enabled until PULL_DIS[0] is set [1]
EPEE & B0EPEE	Pull Up to 2.6 volts (always enabled)
$\overline{\text{HRESET}}$	Boards should always have an external pull up resistor

[1] External pull resistor should be in the same direction as the setting of the PULL_SEL signal (pin).

To minimize currents, pins with internal pull down devices should have external pull downs. It is recommended that a 10K Ω pull down be used on boards.

6 References

Photos in Figure 1 copyright Glenair, Inc.

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Appendix A
MPC56x Initial EVB Nexus Connectors

Early versions of the MPC56x evaluation boards included a 40-pin connector. This connector is not compatible with connector B of the revised Nexus connectors. The following pinout information is provided for reference ONLY and should NOT be used for new designs.

A.1 MPC56x Full-Port Configuration

The MPC56x supports eight message data outputs and two message data inputs. This provides a maximum throughput of debug information to and from the Nexus tool (see Table 2). In the full-port configuration, transfers from the microcontroller can be up to 56 Mbytes (448 Mbits) per second (56-MHz system clock speed x the 8-bit data output port). Messages into the microcontroller can be transmitted at up to 56 Mbits per second (one-half the 56-MHz system clock x the 2-bit data input port).

Table A-1. MPC565 Nexus 40-Pin Definition (Full-Port Mode)

MPC565 Ball	MPC565 Signal	Nexus Auxiliary Signal	I/O	Pin Number	Pin Number	I/O	Nexus Auxiliary Signal	MPC565 Signal	MPC565 Ball
AB23	$\overline{\text{HRESET}}$	/RESET	IN [1]	1	2	—	VREF	VCC2.6	VDD
M2	$\overline{\text{EVTI}}$	/EVTI	IN[1]	3	4	—	VALTREF	VSTBY2.6	— [2]
M3	$\overline{\text{RSTI}}$	/RSTI	IN[1]	5	6	IN or OUT	VENDOR_IO1	SGPIOC[7]/ $\overline{\text{IRQOUT}}$/ LWP0	AC14
M4	$\overline{\text{MSEI}}$	/MSEI	IN[1]	7	8	—	GND	GND	—
L4	MCKI	MCKI	IN[1]	9	10	—	GND	GND	—
L1	MDI[0]	MDI0	IN[1]	11	12	—	GND	GND	—
—	—	Reserved	OUT	13	14	—	GND	GND	—
—	—	Reserved	OUT	15	16	IN[1] or OUT	VENDOR_IO2	EPEE & B0EPEE	AF21 & AD20
AF14	$\overline{\text{BG}}$/VF[0]/ LWP[1]	/EVTO	OUT	17	18	—	GND	GND	—
T2	$\overline{\text{MSEO}}$	/MSEO	OUT	19	20	—	GND	GND	—
P3	MCKO	MCKO	OUT	21	22	—	GND	GND	—
P4	MDO[0]	MDO0	OUT	23	24	—	GND	GND	—
R1	MDO[1]	MDO1	OUT	25	26	—	GND	GND	—
R3	MDO[2]	MDO2	OUT	27	28	—	GND	GND	—
T1	MDO[3]	MDO3	OUT	29	30	—	GND	GND	—
N2	MDO[4]/ MPIO[10]	MDO4	OUT	31	32	—	GND	GND	—
N4	MDO[5]/ MPIO[9]	MDO5	OUT	33	34	—	GND	GND	—
N3	MDO[6]/ MPIO[8]	MDO6	OUT	35	36	—	GND	GND	—
P1	MDO[7]/ MPIO[7]	MDO7	OUT	37	38	—	GND	GND	—
L3	MDI[1]	MDI1	IN[1]	39	40	—	GND	GND	—

1 The Nexus standard recommends that all inputs should have 10K Ω pull-up resistors to VREF (2.6 volts). Exception: The $\overline{\text{RSTI}}$ input should have a 10K Ω pull-down resistor. This is in line with the proposed new standard.

2 These signals depend on system requirements: KAPWR (Y26), VDDSRAM1 (E3), VDDSRAM2 (D2), VDDSRAM3 (G4).

Table A-2. MPC561/MPC563 Nexus 40-Pin Definition (Full-Port Mode)

MPC561/ MPC563 Ball	MPC561/ MPC563 Signal	Nexus Auxiliary Signal	I/O	Pin Number	Pin Number	I/O	Nexus Auxiliary Signal	MPC561/MPC563 Signal	MPC561/ MPC563 Ball
W23	$\overline{\text{HRESET}}$	/RESET	IN [1]	1	2	—	VREF	VCC2.6	VDD
M2	TMS/$\overline{\text{EVTI}}$	/EVTI	IN[2]	3	4	—	VALTREF	VSTBY2.6	— [2]
L1	JCOMP/RSTI	/RSTI	IN[1]	5	6	IN or OUT	VENDOR_IO1	SGPIOC[7] / $\overline{\text{IRQOUT}}$/ LWP0	R1
M24	VF[2]/ MPIO32B[2]/ MSEI	/MSEI	IN[2]	7	8	—	GND	GND	—
L2	TCK/DSCK/ MCKI	MCKI	IN[2]	9	10	—	GND	GND	—
M1	TDI/DSDI/ MDI[0]	MDI0	IN[2]	11	12	—	GND	GND	—
—	—	Reserved	OUT	13	14	—	GND	GND	—
—	—	Reserved	OUT	15	16	IN[2] or OUT	VENDOR_IO2	EPEE & B0EPEE	T23 & T24
R3	$\overline{\text{BG}}$/VF[0]/ LWP[1]	/EVTO	OUT	17	18	—	GND	GND	—
M25	VFLS[0]/ MPIO32B[3]/ $\overline{\text{MSEO}}$	/MSEO	OUT	19	20	—	GND	GND	—
L24	VF[1]/ MPIO32B[1]/ MCKO	MCKO	OUT	21	22	—	GND	GND	—
M4	TDO/DSDO/ MDO[0]	MDO0	OUT	23	24	—	GND	GND	—
L23	VF[0]/ MPIO32B[0]/ MDO[1]	MDO1	OUT	25	26	—	GND	GND	—
G23	MPWM[1]/ MDO[2]	MDO2	OUT	27	28	—	GND	GND	—
H23	MPWM[17]/ MDO[3]	MDO3	OUT	29	30	—	GND	GND	—
P3	IRQ[0]/ SGPIOC0/ MDO[4]	MDO4	OUT	31	32	—	GND	GND	—

Table A-2. MPC561/MPC563 Nexus 40-Pin Definition (Full-Port Mode) (continued)

MPC561/ MPC563 Ball	MPC561/ MPC563 Signal	Nexus Auxiliary Signal	I/O	Pin Number	Pin Number	I/O	Nexus Auxiliary Signal	MPC561/MPC563 Signal	MPC561/ MPC563 Ball
H26	MPIOB32[5]/ MDO[5]	MDO5	OUT	33	34	—	GND	GND	—
J23	MPIO32B[6]/ MPWM[4]/ MDO[6]	MDO6	OUT	35	36	—	GND	GND	—
H25	MPWM[19]/ MDO[7]	MDO7	OUT	37	38	—	GND	GND	—
F26	MPWM[0]/ MDI[1]	MDI1	IN[2]	39	40	—	GND	GND	—

1 The Nexus standard recommends that all inputs should have 10K Ω pull-up resistors to VREF (2.6 volts). Exception: the $\overline{\text{RSTI}}$ input should have a 10K Ω pull-down resistor. This is in line with the proposed new standard.

2 These signals depend on system requirements: KAPWR (Y26), VDDSRAM1 (E3), VDDSRAM2 (D2), VDDSRAM3 (G4).

NOTE

Adapters that connect the 40-pin to the 50-pin connectors, and the 51-pin connectors to the 40-pin or 50-pin connectors, are available from Axiom Manufacturing (http://www.axman.com). See Table A-3.

Table A-3. Adapters Available from Axiom Manufacturing

Cable Connector (Socket)	Board Connector (Plug)	Axiom Part Number
40-pin AMP	50-pin	Nexus 4050
50-pin AMP	40-pin	Nexus 5040
51-pin Robust	50-pin	Nexus 5150
51-pin Robust	40-pin	Nexus 5140
40-pin AMP	51-pin Robust	Nexus 4051
50-pin AMP	51-pin Robust	Nexus 5051

7 Revision History

Table 9 provides a revision history for this application note.

Table 9. Document Revision History

Revision Number	Substantive Changes	Release Date
0	Initial release.	December 2002
0.1	Table 1: Corrected part numbers for connector options C1 and C2.	February 2003

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