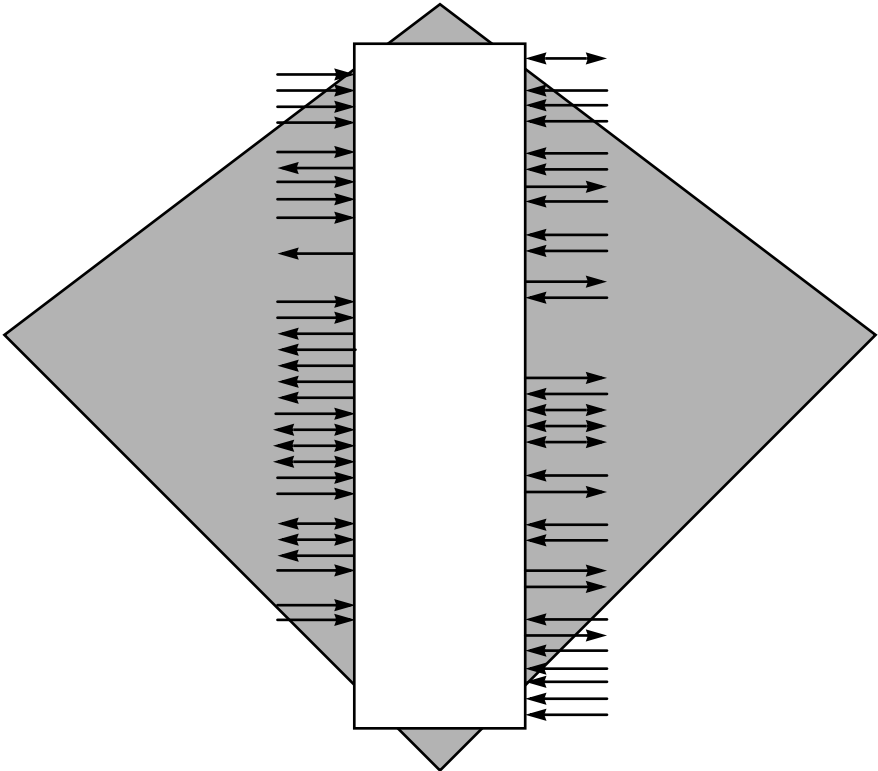


SECTION 2

SIGNAL/CONNECTION DESCRIPTION





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2.1 INTRODUCTION

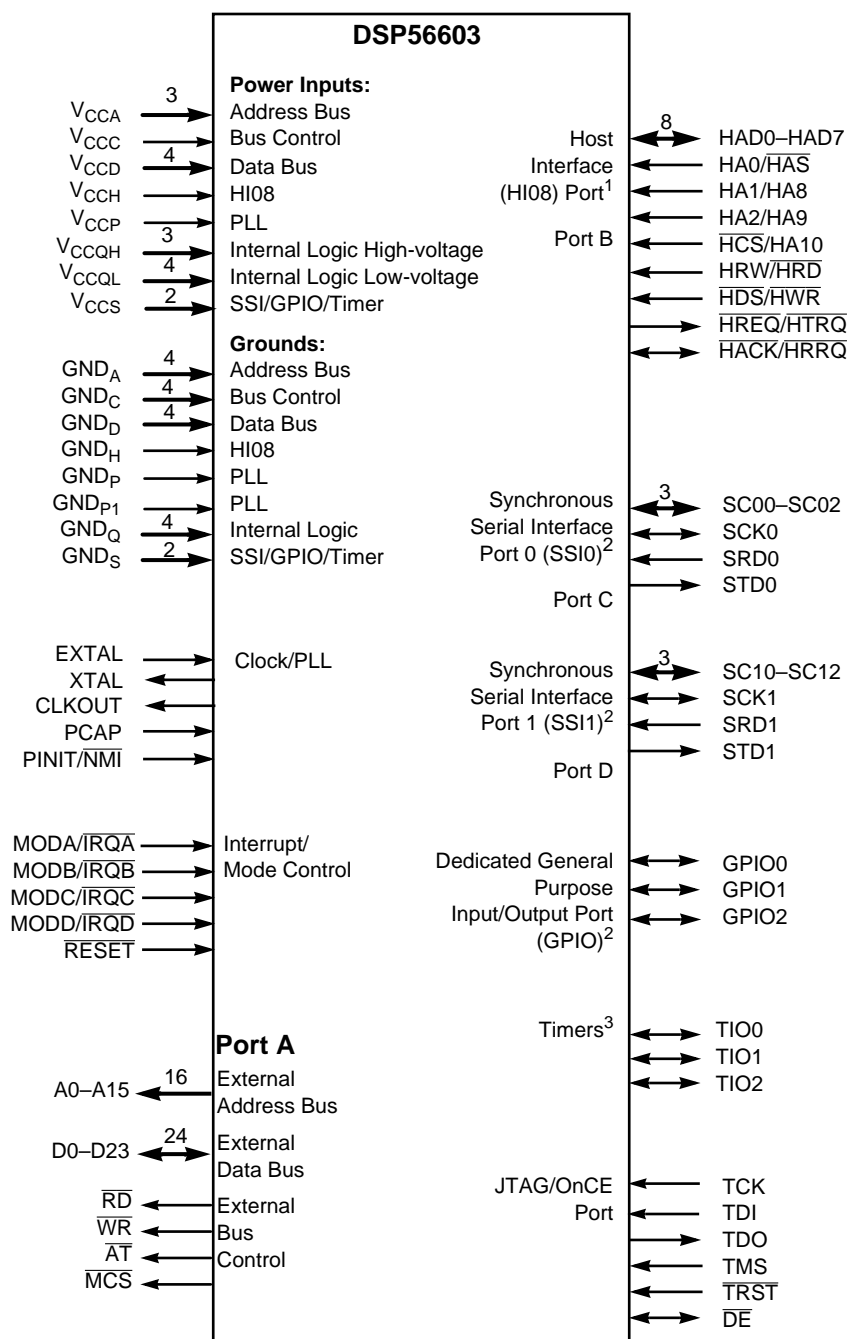
The input and output signals of the DSP56603 are organized into functional groups, as shown in **Table 2-1** and as illustrated in **Figure 2-1**. In **Table 2-2** through **Table 2-13**, each table row describes the signal or signals present on a pin.

The DSP56603 operates from a 3 V supply; however, some of the inputs can tolerate 5 V. A special notice for this feature is added to the signal descriptions of those inputs.

Table 2-1 Functional Group Signal Allocations

Functional Group		Number of Signals	Detailed Description
Power (V_{CC})		19	Table 2-2
Ground (GND)		19	Table 2-3
PLL and Clock Signals		5	Table 2-4
Interrupt and Mode Control		5	Table 2-5
External Memory Port (also referred to as Port A)	Address Bus	16	Table 2-6
	Data Bus	24	
	Bus Control	4	
Host Interface (HI08)	Port B (GPIO)	16	Table 2-8
Synchronous Serial Interface 0 (SSI0)	Port C (GPIO)	6	Table 2-9
Synchronous Serial Interface 1 (SSI1)	Port D (GPIO)	6	Table 2-10
General Purpose Input/Output (GPIO)		3	Table 2-11
Triple Timer		3	Table 2-12
JTAG/On-Chip Emulation (OnCE) Port		6	Table 2-13

Introduction



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- Note:
1. The HI08 port supports a non-multiplexed or a multiplexed bus, single or double Data Strobe (DS), and single or double Host Request (HR) configurations. Since each these modes is configured independently, any combination of these modes is possible. The HI08 signals can also be configured alternately as GPIO signals (PB0–PB15).
 2. The SSI0 and SSI1 signals can be configured alternatively as Port C GPIO signals (PC0–PC5) and Port D GPIO signals (PD0–PD5), respectively.
 3. TIO0–TIO2 can be configured alternatively as GPIO signals.

Figure 2-1 DSP56603 Signals Identified by Functional Group

2.2 POWER

Table 2-2 Power Inputs

Signal Name (number of pins)	Signal Description
V_{CCA} (3)	Address Bus Power — V_{CCA} is an isolated power for sections of address bus I/O drivers, and must be tied externally to all other chip power inputs, except for the V_{CCQL} input. The user must provide adequate external decoupling capacitors.
V_{CCC} (1)	Bus Control Power — V_{CCC} is an isolated power for the bus control I/O drivers, and must be tied to all other chip power inputs externally, except for the V_{CCQL} input. The user must provide adequate external decoupling capacitors.
V_{CCD} (4)	Data Bus Power — V_{CCD} is an isolated power for sections of data bus I/O drivers, and must be tied to all other chip power inputs externally, except for the V_{CCQL} input. The user must provide adequate external decoupling capacitors.
V_{CCH} (1)	Host Power — V_{CCH} is an isolated power for the HI08 logic, and must be tied to all other chip power inputs externally, except for the V_{CCQL} input. The user must provide adequate external decoupling capacitors.
V_{CCP} (1)	PLL Power — V_{CCP} is V_{CC} dedicated for Phase Lock Loop (PLL) use. The voltage should be well-regulated and the input should be provided with an extremely low impedance path to the V_{CC} power rail.
V_{CCQH} (3)	<p>Quiet Power High Voltage—V_{CCQH} is an isolated power for the CPU logic, and must be tied to all other chip power inputs externally, except for the V_{CCQL} input. The user must provide adequate external decoupling capacitors.</p> <p>The voltage supplied to these inputs should equal the voltage supplied to I/O power inputs V_{CCA}, V_{CCC}, V_{CCD}, V_{CCH}, and V_{CCS}.</p>
V_{CCQL} (4)	<p>Quiet Power Low Voltage—V_{CCQL} is an isolated power for the CPU logic, and should not be tied to the other chip power inputs. The user must provide adequate external decoupling capacitors.</p> <p>The voltage supplied to these inputs should be equal to or lower than the voltage supplied to the V_{CCQH} inputs. The user can lower the voltage supplied to V_{CCQL} as long as it meets the MIPS requirements of the application, thus lowering the chip's overall power consumption.</p>

Table 2-2 Power Inputs (Continued)

Signal Name (number of pins)	Signal Description
V_{CCS} (2)	SSI, GPIO, and Timers Power — V_{CCS} is a isolated power for the SSIs, GPIO, and Timers logic, and must be tied to all other chip power inputs externally, except for the V_{CCQL} input. The user must provide adequate external decoupling capacitors.

2.3 GROUND

Table 2-3 Grounds

Signal Name (number of pins)	Signal Description
GND_A (4)	Address Bus Ground — GND_A is an isolated ground for sections of address bus I/O drivers, and must be tied externally to all other chip ground connections. The user must provide adequate external decoupling capacitors.
GND_C (2)	Bus Control Ground — GND_C is an isolated ground for the bus control I/O drivers, and must be tied externally to all other chip ground connections. The user must provide adequate external decoupling capacitors.
GND_D (4)	Data Bus Ground — GND_D is an isolated ground for sections of the data bus I/O drivers, and must be tied externally to all other chip ground connections. The user must provide adequate external decoupling capacitors.
GND_H (1)	Host Ground — GND_H is an isolated ground for the HI08 I/O drivers, and must be tied externally to all other chip ground connections. The user must provide adequate external decoupling capacitors.
GND_P (1)	PLL Ground — GND_P is ground dedicated for PLL use, and should be provided with an extremely low impedance path to ground. V_{CCP} should be bypassed to GND_P with a 0.1 μF capacitor located as close as possible to the chip package.
GND_{P1} (1)	PLL Ground 1 — GND_{P1} is ground dedicated for PLL use, and should be provided with an extremely low impedance path to ground.

Table 2-3 Grounds (Continued)

Signal Name (number of pins)	Signal Description
GND _Q (4)	Quiet Ground —GND _Q is an isolated ground for the CPU logic, and must be tied externally to all other chip ground connections. The user must provide adequate external decoupling capacitors.
GND _S (2)	SSIs, GPIO, and Timers Ground —GNDS is an isolated ground for the SSIs, GPIO, and Timers logic, and must be tied externally to all other chip ground connections. The user must provide adequate external decoupling capacitors.

2.4 CLOCK AND PHASE LOCK LOOP

Table 2-4 Clock and PLL Signals

Signal Name	Signal Type	State During Reset	Signal Description
EXTAL	Input	Input	External Clock/Crystal Input —EXTAL interfaces the internal crystal oscillator input to an external crystal or an external clock.
XTAL	Output	Chip-driven	Crystal Output —XTAL connects the internal crystal oscillator output to an external crystal. If an external clock is used, leave XTAL unconnected.
PCAP	Input	Indeterminate	PLL Capacitor —PCAP is an input connecting an off-chip capacitor to the PLL filter. Connect one capacitor terminal to PCAP and the other terminal to V _{CCP} . If the PLL is not used, PCAP may be tied to V _{CC} , GND, or left floating.
CLKOUT	Output	Chip-driven	Clock Output —CLKOUT provides an output clock synchronized to the internal core clock phase. When the PLL is enabled, the Division Factor (DF) equals one, and the Multiplication Factor (MF) is less than or equal to four, CLKOUT is also synchronized to EXTAL. When the PLL is disabled, the CLKOUT frequency is half the frequency of EXTAL.

Table 2-4 Clock and PLL Signals (Continued)

Signal Name	Signal Type	State During Reset	Signal Description
PINIT/ $\overline{\text{NMI}}$	Input	Input	<p>PLL Initial/Non-Maskable Interrupt—During assertion of $\overline{\text{RESET}}$, the value of PINIT/$\overline{\text{NMI}}$ is written into the PLL Enable (PEN) bit of the PLL control register, determining whether the PLL is enabled or disabled.</p> <p>After $\overline{\text{RESET}}$ deassertion and during normal instruction processing, the PINIT/$\overline{\text{NMI}}$ Schmitt-trigger input is a negative-edge-triggered Non-Maskable Interrupt (NMI) request internally synchronized to CLKOUT.</p> <p>This input can tolerate 5 V.</p>

2.5 INTERRUPT AND MODE CONTROL

Table 2-5 Interrupt and Mode Control Signals

Signal Name	Signal Type	State During Reset	Signal Description
$\overline{\text{RESET}}$	Input	Input	<p>Reset—$\overline{\text{RESET}}$ is an active low, Schmitt-trigger input. Deassertion of the $\overline{\text{RESET}}$ signal is internally synchronized to the clock out (CLKOUT). When asserted, the chip is placed in the reset state and the internal phase generator is reset. The Schmitt-trigger input allows a slowly rising input, such as a capacitor charging, to reliably reset the chip. If the $\overline{\text{RESET}}$ signal is deasserted synchronous to CLKOUT, exact start-up timing is guaranteed, allowing multiple processors to start up synchronously and operate together. When the $\overline{\text{RESET}}$ signal is deasserted, the initial chip operating mode is latched from the MODA, MODB, MODC, and MODD inputs.</p> <p>This input can tolerate 5 V.</p>

Table 2-5 Interrupt and Mode Control Signals (Continued)

Signal Name	Signal Type	State During Reset	Signal Description
MODA/ $\overline{\text{IRQA}}$	Input	Input	<p>Mode Select A/External Interrupt Request A—MODA/$\overline{\text{IRQA}}$ is an active low Schmitt-trigger input, internally synchronized to CLKOUT. MODA/$\overline{\text{IRQA}}$ selects the initial chip operating mode during hardware reset and becomes a level-sensitive or negative-edge-triggered, maskable interrupt request input during normal instruction processing. MODA, MODB, MODC, and MODD select one of sixteen initial chip operating modes latched into the Operating Mode Register (OMR) when the $\overline{\text{RESET}}$ signal is deasserted. If $\overline{\text{IRQA}}$ is asserted synchronous to CLKOUT, multiple processors can be resynchronized using the WAIT instruction and asserting $\overline{\text{IRQA}}$ to exit the Wait state. If the processor is in the Stop standby state and $\overline{\text{IRQA}}$ is asserted, the processor exits the Stop state.</p> <p>This input can tolerate 5 V.</p>
MODB/ $\overline{\text{IRQB}}$	Input	Input	<p>Mode Select B/External Interrupt Request B—MODB/$\overline{\text{IRQB}}$ is an active low Schmitt-trigger input, internally synchronized to CLKOUT. MODB/$\overline{\text{IRQB}}$ selects the initial chip operating mode during hardware reset and becomes a level-sensitive or negative-edge-triggered, maskable interrupt request input during normal instruction processing. MODA, MODB, MODC, and MODD select one of sixteen initial chip operating modes latched into the OMR register when the $\overline{\text{RESET}}$ signal is deasserted. If $\overline{\text{IRQB}}$ is asserted synchronous to CLKOUT, multiple processors can be resynchronized using the WAIT instruction and asserting $\overline{\text{IRQB}}$ to exit the Wait state.</p> <p>This input can tolerate 5 V.</p>

Interrupt And Mode Control

Table 2-5 Interrupt and Mode Control Signals (Continued)

Signal Name	Signal Type	State During Reset	Signal Description
MODC/ $\overline{\text{IRQC}}$	Input	Input	<p>Mode Select C/External Interrupt Request C—MODC/$\overline{\text{IRQC}}$ is an active low Schmitt-trigger input, internally synchronized to CLKOUT. MODC/$\overline{\text{IRQC}}$ selects the initial chip operating mode during hardware reset and becomes a level-sensitive or negative-edge-triggered, maskable interrupt request input during normal instruction processing. MODA, MODB, MODC, and MODD select one of sixteen initial chip operating modes latched into the OMR register when the $\overline{\text{RESET}}$ signal is deasserted. If $\overline{\text{IRQC}}$ is asserted synchronous to CLKOUT, multiple processors can be resynchronized using the WAIT instruction and asserting $\overline{\text{IRQC}}$ to exit the Wait state.</p> <p>This input can tolerate 5 V.</p>
MODD/ $\overline{\text{IRQD}}$	Input	Input	<p>Mode Select D/External Interrupt Request D—MODD/$\overline{\text{IRQD}}$ is an active low Schmitt-trigger input, internally synchronized to CLKOUT. MODD/$\overline{\text{IRQD}}$ selects the initial chip operating mode during hardware reset and becomes a level-sensitive or negative-edge-triggered, maskable interrupt request input during normal instruction processing. MODA, MODB, MODC, and MODD select one of sixteen initial chip operating modes, latched into OMR when the $\overline{\text{RESET}}$ signal is deasserted. If $\overline{\text{IRQD}}$ is asserted synchronous to CLKOUT, multiple processors can be re-synchronized using the WAIT instruction and asserting $\overline{\text{IRQD}}$ to exit the Wait state.</p> <p>This input can tolerate 5 V.</p>

2.6 EXPANSION PORT (PORT A)

Table 2-6 Expansion Port, Port A Signals

Signal Name	Signal Type	State During Reset	Signal Description
A0–A15	Output	Set according to chip operating mode ¹	Address Bus —These active high outputs specify the address for external program memory accesses. To minimize power dissipation, A0–A15 do not change state when external memory spaces are not being accessed.
D0–D23	Input/Output	Tri-stated	Data Bus —These active high, bidirectional input/outputs provide the bidirectional data bus for external program memory accesses. D0–D23 are tri-stated when no external bus activity occurs, and during hardware reset.
$\overline{\text{MCS}}$	Output	Pulled high internally	Memory Chip Select —This signal is an active low output, and is asserted when an external memory access occurs. $\overline{\text{MCS}}$ is deasserted during hardware reset.
$\overline{\text{RD}}$	Output	Pulled high internally	Read Enable —This signal is an active low output. $\overline{\text{RD}}$ is asserted to read external memory on the data bus (D0–D23). $\overline{\text{RD}}$ is deasserted during hardware reset.
$\overline{\text{WR}}$	Output	Pulled high internally	Write Enable —This signal is an active low output. $\overline{\text{WR}}$ is asserted to write external memory on the data bus (D0–D23). $\overline{\text{WR}}$ is deasserted during hardware reset.
$\overline{\text{AT}}$	Output	Pulled high internally	Address Tracing —This signal is an active low output. $\overline{\text{AT}}$ is asserted (for half of a clock cycle) whenever a new address is driven on the address bus (A0–A15) in the Program Address Tracing mode. The new address is either a reflection of internal fetch or internal program space move instruction or an external address driven for an external access. $\overline{\text{AT}}$ is deasserted during hardware reset.
Note: 1. The A0–A15 pins are asserted according to the selected chip operating mode, as determined by the values on the MODA–MODD pins. Each mode has a different reset address. A0–A15 are latched to the value of that reset address minus 1. For example, if the reset address for a selected operating mode is \$0800, the address bus is asserted to \$07FF.			

Host Interface (HI08)

2.7 HOST INTERFACE (HI08)

The HI08 provides a fast 8-bit port that can be connected directly to the host bus. The HI08 supports a variety of standard buses, and can be directly connected to a number of industry standard microcomputers, microprocessors, DSPs, and DMA hardware.

2.7.1 Host Port Usage Considerations

Careful synchronization is required when reading multiple-bit registers that are written by another asynchronous system. This is a common problem when two asynchronous systems are connected (as they are in the Host port). The considerations for proper operation are discussed in the following table:

Table 2-7 Host Port Usage Considerations

Action	Description
Asynchronous read of receive byte registers	When reading the receive byte registers, Receive High (RXH) register or Receive Low (RXL) register, the Host Interface programmer should use interrupts or poll the Receive Register Data Full (RXDF) flag, which indicates that data is available. This assures that the data in the receive byte registers is valid.
Asynchronous write to transmit byte registers	The host interface programmer should not write to the transmit byte registers, Transmit High (TXH) register or Transmit Low (TXL) register, unless the Transmit Register Data Empty (TXDE) bit is set, which indicates that the transmit byte registers are empty. This guarantees that the transmit byte registers transfer valid data to the Host Receive (HRX) register.
Asynchronous write to host vector	The Host Interface programmer should change the Host Vector (HV) register only when the Host Command (HC) bit is clear. This guarantees that the DSP interrupt control logic receives a stable vector.

2.7.2 Host Port Configuration

The signal functions associated with the HI08 vary according to the configuration determined by the HI08 Port Control Register (HPCR). Refer to **Section 7, Host Interface (HI08)**, for detailed descriptions of this and the other configuration registers used with the HI08.

Table 2-8 Host Interface Signals

Signal Name	Signal Type	State During Reset	Signal Description
HAD0–HAD7	Bi-directional	Disconnected internally	Host Data Bus —When the HI08 is programmed to interface a non-multiplexed host bus and the HI function is selected, these signals are lines 0–7 of the Host Data bidirectional tri-state bus (HD0–HD7).
	Bi-directional		Host Address and Data Bus —When the HI08 is programmed to interface a multiplexed host bus and the HI function is selected, these signals are lines 0–7 of the Host Address/Data multiplexed bidirectional tri-state bus (HAD0–HAD7).
	Input or Output		Port B 0–7 —When the HI08 is configured as GPIO through the HI08 Port Control Register (HPCR), these signals are individually programmed as inputs or outputs through the HI08 Data Direction Register (HDDR). When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.
HA0/ $\overline{\text{HAS}}$	Input	Disconnected internally	Host Address Input 0 —When the HI08 is programmed to interface a non-multiplexed host bus and the HI function is selected, this signal is line 0 of the Host Address input bus (HA0).
	Input		Host Address Strobe —When the HI08 is programmed to interface a multiplexed host bus and the HI function is selected, this signal is the Host Address Strobe ($\overline{\text{HAS}}$) Schmitt-trigger input. The polarity of the address strobe is programmable.
	Input or Output		Port B 8 —When the HI08 is configured as GPIO through the HPCR, this signal is individually programmed as an input or output through the HDDR. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.

Host Interface (HI08)

Table 2-8 Host Interface Signals (Continued)

Signal Name	Signal Type	State During Reset	Signal Description
HA1 / HA8	Input	Discon- nected internally	Host Address Input 1 —When the HI08 is programmed to interface a non-multiplexed host bus and the HI function is selected, this signal is line one of the Host Address input bus (HA1).
	Input		Host Address 8 —When the HI08 is programmed to interface a multiplexed host bus and the HI function is selected, this signal is line eight of the input Host Address bus (HA8).
	Input or Output		Port B 9 —When the HI08 is configured as GPIO through the HPCR, this signal is individually programmed as an input or output through the HDDR. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.
HA2 / HA9	Input	Discon- nected internally	Host Address Input 2 —When the HI08 is programmed to interface a non-multiplexed host bus and the HI function is selected, this signal is line two of the Host Address input bus (HA2).
	Input		Host Address 9 —When the HI08 is programmed to interface a multiplexed host bus and the HI function is selected, this signal is line nine of the input Host Address bus (HA9).
	Input or Output		Port B 10 —When the HI08 is configured as GPIO through the HPCR, this signal is individually programmed as an input or output through the HDDR. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.

Table 2-8 Host Interface Signals (Continued)

Signal Name	Signal Type	State During Reset	Signal Description
HRW / $\overline{\text{HRD}}$	Input	Discon- nected internally	Host Read/Write —When the HI08 is programmed to interface a single-data-strobe host bus and the HI function is selected, this signal is the Read / Write input (HRW).
	Input		Host Read Data —When the HI08 is programmed to interface a double-data-strobe host bus and the HI function is selected, this signal is the Read Data strobe Schmitt-trigger input ($\overline{\text{HRD}}$). The polarity of the data strobe is programmable.
	Input or Output		Port B 11 —When the HI08 is configured as GPIO through the HPCR, this signal is individually programmed as an input or output through the HDDR. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.
$\overline{\text{HDS}}$ / $\overline{\text{HWR}}$	Input	Discon- nected internally	Host Data Strobe —When the HI08 is programmed to interface a single-data-strobe host bus and the HI function is selected, this signal is the Host Data Strobe Schmitt-trigger input ($\overline{\text{HDS}}$). The polarity of the data strobe is programmable.
	Input		Host Write Enable —When the HI08 is programmed to interface a double-data-strobe host bus and the HI function is selected, this signal is the Write Data Strobe Schmitt-trigger input ($\overline{\text{HWR}}$). The polarity of the data strobe is programmable.
	Input or Output		Port B 12 —When the HI08 is configured as GPIO through the HPCR, this signal is individually programmed as an input or output through the HDDR. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.

Host Interface (HI08)

Table 2-8 Host Interface Signals (Continued)

Signal Name	Signal Type	State During Reset	Signal Description
HCS/HA10	Input	Discon- nected internally	Host Chip Select —When the HI08 is programmed to interface a non-multiplexed host bus and the HI function is selected, this signal is the Host Chip Select input ($\overline{\text{HCS}}$). The polarity of the chip select is programmable.
	Input		Host Address 10 —When the HI08 is programmed to interface a multiplexed host bus and the HI function is selected, this signal is line 10 of the input Host Address bus (HA10).
	Input or Output		Port B 13 —When the HI08 is configured as GPIO through the HPCR, this signal is individually programmed as an input or output through the HDDR. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.
$\overline{\text{HREQ}}/\overline{\text{HTRQ}}$	Output	Discon- nected internally	Host Request —When the HI08 is programmed to interface a single host request host bus and the HI function is selected, this signal is the Host Request output ($\overline{\text{HREQ}}$). The polarity of the host request is programmable. The host request can be programmed as a driven or open-drain output.
	Output		Transmit Host Request —When the HI08 is programmed to interface a double host request host bus and the HI function is selected, this signal is the Transmit Host Request output ($\overline{\text{HTRQ}}$). The polarity of the host request is programmable. The host request can be programmed as a driven or open-drain output.
	Input or Output		Port B 14 —When the HI08 is programmed to interface a multiplexed host bus and the signal is configured as GPIO through the HPCR, this signal is individually programmed as an input or output through the HDDR. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.

Table 2-8 Host Interface Signals (Continued)

Signal Name	Signal Type	State During Reset	Signal Description
$\overline{\text{HACK}}$ / $\overline{\text{HRRQ}}$	Input	Disconnected internally	Host Acknowledge —When the HI08 is programmed to interface a single host request host bus and the HI function is selected, this signal is the Host Acknowledge Schmitt-trigger input ($\overline{\text{HACK}}$). The polarity of the host acknowledge is programmable.
	Output		Receive Host Request —When the HI08 is programmed to interface a double host request host bus and the HI function is selected, this signal is the Receive Host Request output ($\overline{\text{HRRQ}}$). The polarity of the host request is programmable. The host request can be programmed as a driven or open-drain output.
	Input or Output		Port B 15 —When the HI08 is configured as GPIO through the HPCR, this signal is individually programmed as an input or output through the HDDR. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.

Synchronous Serial Interface 0 (SSI0)

2.8 SYNCHRONOUS SERIAL INTERFACE 0 (SSI0)

Two identical Synchronous Serial Interfaces (SSI0 and SSI1) provide a full-duplex serial port for serial communication with a variety of serial devices including one or more industry-standard codecs, other DSPs, or microprocessors. When either SSI port is disabled, it can be used for General Purpose I/O (GPIO).

Table 2-9 Synchronous Serial Interface 0 (SSI0)

Signal Name	Signal Type	State During Reset	Signal Description
SC00	Input or Output	Input	Serial Control Signal 0 —The function of SC00 is determined by the selection of either Synchronous or Asynchronous mode. For Asynchronous mode, this signal is used for the receive clock I/O (Schmitt-trigger input). For Synchronous mode, this signal is used for or for Serial I/O Flag 0.
	Input or Output		Port C 0 —When configured as PC0, signal direction is controlled through the SSI0 Port Direction Control Register (PRRC). The signal can be configured as SSI signal SC00 through the SSI0 Port Control Register (PCRC). When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.
SC01	Input or Output	Input	Serial Control Signal 1 —The function of SC00 is determined by the selection of either Synchronous or Asynchronous mode. For Asynchronous mode, this signal is used for the receive clock I/O (Schmitt-trigger input). For Synchronous mode, this signal is used for Serial I/O Flag 1.
	Input or Output		Port C 1 —When configured as PC1, signal direction is controlled through the PRRRC register. The signal can be configured as an SSI signal SC01 through the PCRC register. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.

Synchronous Serial Interface 0 (SSI0)

Table 2-9 Synchronous Serial Interface 0 (SSI0) (Continued)

Signal Name	Signal Type	State During Reset	Signal Description
SC02	Input or Output	Input	<p>Serial Control Signal 2—SC02 is the frame sync for both the transmitter and receiver in Synchronous mode, and for the transmitter only in Asynchronous mode. When configured as an output, this signal is the internally generated frame sync signal. When configured as an input, this signal receives an external frame sync signal for the transmitter (and the receiver in synchronous operation).</p>
	Input or Output		<p>Port C 2—When configured as PC2, signal direction is controlled through the PRRC register. The signal can be configured as an SSI signal SC02 through the PCRC register.</p> <p>When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>
SCK0	Input or Output	Input	<p>Serial Clock—SCK0 is a bidirectional Schmitt-trigger input signal providing the serial bit rate clock for the SSI interface. The SCK0 is a clock input or output used by both the transmitter and receiver in Synchronous modes, or by the transmitter in Asynchronous modes.</p> <p>Although an external serial clock can be independent of and asynchronous to the DSP system clock, it must exceed the minimum clock cycle time of 6T (i.e., the system clock frequency must be at least three times the external SSI clock frequency). The SSI needs at least three DSP phases inside each half of the serial clock.</p>
	Input or Output		<p>Port C 3—When configured as PC3, signal direction is controlled through the PRRC register. The signal can be configured as an SSI signal SCK0 through the PCRC register.</p> <p>When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>

Synchronous Serial Interface 0 (SSI0)

Table 2-9 Synchronous Serial Interface 0 (SSI0) (Continued)

Signal Name	Signal Type	State During Reset	Signal Description
SRD0	Input Input or Output	Input	<p>Serial Receive Data—SRD0 receives serial data and transfers the data to the SSI receive shift register. SRD0 is an input when data is being received.</p> <p>Port C 4—When configured as PC4, signal directions is controlled through the PRRC register. The signal can be configured as an SSI signal SRD0 through the PCRC register.</p> <p>When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>
STD0	Output Input or Output	Input	<p>Serial Transmit Data—STD0 is used for transmitting data from the serial transmit shift register. STD0 is an output when data is being transmitted.</p> <p>Port C 5—When configured as PC5, signal directions is controlled through the PRRC register. The signal can be configured as an SSI signal STD0 through the PCRC register.</p> <p>When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>

2.9 SYNCHRONOUS SERIAL INTERFACE 1 (SSI1)

Table 2-10 Synchronous Serial Interface 1 (SSI1)

Signal Name	Signal Type	State During Reset	Signal Description
SC10	Input or Output	Input	<p>Serial Control Signal 0—The function of SC10 is determined by the selection of either Synchronous or Asynchronous mode. For Asynchronous mode, this signal is used for the receive clock I/O (Schmitt-trigger input). For Synchronous mode, this signal is used for or for Serial I/O Flag 0.</p>
	Input or Output		<p>Port D 0—When configured as PD0, signal direction is controlled through the SSI1 Port Direction Control Register (PRRD). The signal can be configured as SSI signal SC10 through the SSI1 Port Control Register (PCRD).</p> <p>When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>
SC11	Input or Output	Input	<p>Serial Control Signal 1—The function of SC11 is determined by the selection of either Synchronous or Asynchronous mode. For Asynchronous mode, this signal is used for the receive clock I/O (Schmitt-trigger input). For Synchronous mode, this signal is used for Serial I/O Flag 1.</p>
	Input or Output		<p>Port D 1—When configured as PD1, signal direction is controlled through the PRRD register. The signal can be configured as an SSI signal SC11 through the PCRD register.</p> <p>When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>

Synchronous Serial Interface 1 (SSI1)

Table 2-10 Synchronous Serial Interface 1 (SSI1) (Continued)

Signal Name	Signal Type	State During Reset	Signal Description
SC12	Input or Output	Input	<p>Serial Control Signal 2—SC12 is used for frame sync I/O. SC12 is the frame sync for both the transmitter and receiver in Synchronous mode, and for the transmitter only in Asynchronous mode. When configured as an output, this signal is the internally generated frame sync signal. When configured as an input, this signal receives an external frame sync signal for the transmitter (and the receiver in synchronous operation).</p>
	Input or Output		<p>Port D 2—When configured as PD2, signal direction is controlled through the PRRD register. The signal can be configured as an SSI signal SC12 through the PCRD register.</p> <p>When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>
SCK1	Input or Output	Input	<p>Serial Clock—SCK1 is a bidirectional Schmitt-trigger input signal providing the serial bit rate clock for the SSI interface. The SCK1 is a clock input or output used by both the transmitter and receiver in Synchronous modes, or by the transmitter in Asynchronous modes.</p> <p>Although an external serial clock can be independent of and asynchronous to the DSP system clock, it must exceed the minimum clock cycle time of 6T (i.e., the system clock frequency must be at least three times the external SSI clock frequency). The SSI needs at least three DSP phases inside each half of the serial clock.</p>
	Input or Output		<p>Port D 3—When configured as PD3, signal direction is controlled through the PRRD register. The signal can be configured as an SSI signal SCK1 through the PCRD register.</p> <p>When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>

Synchronous Serial Interface 1 (SSI1)

Table 2-10 Synchronous Serial Interface 1 (SSI1) (Continued)

Signal Name	Signal Type	State During Reset	Signal Description
SRD1	Input	Input	Serial Receive Data —SRD1 receives serial data and transfers the data to the SSI Receive Shift Register.
	Input or Output		<p>Port D 4—When configured as PD4, signal direction is controlled through the PRRD register. The signal can be configured as an SSI signal SRD1 through the PCRD register.</p> <p>When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>
STD1	Input	Input	Serial Transmit Data —STD1 is used for transmitting data from the SSI Transmit Shift Register.
	Input or Output		<p>Port D 5—When configured as PD5, signal direction is controlled through the PRRD register. The signal can be configured as an SSI signal STD1 through the PCRD register.</p> <p>When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>

2.10 GENERAL PURPOSE I/O, GPIO

Three dedicated General Purpose Input/Output (GPIO) signals are provided on the DSP56603. Each is reconfigurable as input, output, or tri-state. These signals are exclusively defined as GPIO, and do not offer additional functionality.

Table 2-11 General Purpose I/O (GPIO)

Signal Name	Signal Type	State During Reset	Signal Description
GPIO0	Input or Output	Input	<p>General Purpose I/O 0—When a GPIO signal is used as input, the logic state is reflected to an internal register and can be read by the software. When a GPIO signal is used as output, the logic state is controlled by the software.</p> <p>This input can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>
GPIO1	Input or Output	Input	<p>General Purpose I/O 1—When a GPIO signal is used as input, the logic state is reflected to an internal register and can be read by the software. When a GPIO signal is used as output, the logic state is controlled by the software.</p> <p>This input can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>
GPIO2	Input or Output	Input	<p>General Purpose I/O 2—When a GPIO signal is used as input, the logic state is reflected to an internal register and can be read by the software. When a GPIO signal is used as output, the logic state is controlled by the software.</p> <p>This input can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.</p>

2.11 TRIPLE TIMER

Three identical and independent timers are implemented. The three timers can use internal or external clocking and can interrupt the DSP after a specified number of events (clocks), or can signal an external device after counting a specific number of internal events. When a timer port is disabled, it can be used for General Purpose I/O (GPIO).

Table 2-12 Triple Timer Signals

Signal Name	Signal Type	State During Reset	Signal Description
TIO0	Input or Output	GPIO Input	Timer 0 Schmitt-Trigger Input/Output —When TIO0 is used as an input, the timer module functions as an external event counter or measures external pulse width or signal period. When TIO0 is used as an output, the timer module functions as a timer and TIO0 provides the timer pulse.
	Input or Output		When TIO0 is not used by the timer module, it can be used for GPIO. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.
TIO1	Input or Output	GPIO Input	Timer 1 Schmitt-Trigger Input/Output —When TIO1 is used as an input, the timer module functions as an external event counter or measures external pulse width or signal period. When TIO1 is used as an output, the timer module functions as a timer and TIO1 provides the timer pulse.
	Input or Output		When TIO1 is not used by the timer module, it can be used for GPIO. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.
TIO2	Input or Output	GPIO Input	Timer 2 Schmitt-Trigger Input/Output —When TIO2 is used as an input, the timer module functions as an external event counter or measures external pulse width or signal period. When TIO2 is used as an output, the timer module functions as a timer and TIO2 provides the timer pulse.
	Input or Output		When TIO2 is not used by the timer module, it can be used for GPIO. When configured as an input, this pin can tolerate 5 V. This pin is electrically disconnected internally during Stop mode.

2.12 JTAG/ONCE INTERFACE

Table 2-13 JTAG Interface/On-Chip Emulator Interface (OnCE) Signals

Signal Name	Signal Type	State During Reset	Signal Description
TCK	Input	Input	<p>Test Clock—TCK is a test clock input signal used to synchronize the JTAG test logic. The TCK pin can be tri-stated.</p> <p>This input can tolerate 5 V.</p>
TDI	Input	Input	<p>Test Data Input— TDI is a test data serial input signal used for test instructions and data. TDI is sampled on the rising edge of the TCK signal and has an internal pull-up resistor.</p> <p>This input can tolerate 5 V.</p>
TDO	Output	Tri-stated	<p>Test Data Output— TDO is a test data serial output signal used for test instructions and data. TDO is tri-stateable and is actively driven in the shift-IR and shift-DR controller states. TDO changes on the falling edge of the TCK signal.</p>
TMS	Input	Input	<p>Test Mode Select— TMS is an input signal used to sequence the test controller's state machine. TMS is sampled on the rising edge of the TCK signal and has an internal pull-up resistor.</p> <p>This input can tolerate 5 V.</p>
$\overline{\text{TRST}}$	Input	Input	<p>Test Reset—$\overline{\text{TRST}}$ is an active-low Schmitt-trigger input signal used to asynchronously initialize the test controller. $\overline{\text{TRST}}$ has an internal pull-up resistor. $\overline{\text{TRST}}$ must be asserted after power up.</p> <p>This input can tolerate 5 V.</p>
$\overline{\text{DE}}$	Bi-directional	Input	<p>Debug Event—$\overline{\text{DE}}$ is an open-drain bidirectional active-low signal providing, as an input, a means of entering the debug mode of operation from an external command controller, and as an output, a means of acknowledging that the chip has entered the debug mode. The $\overline{\text{DE}}$ has an internal pull-up resistor.</p> <p>When this pin is an input, it can tolerate 5 V.</p>