

# Multiple TMS320DM6467 PCI Interface

**DSPS** Applications

#### ABSTRACT

The DM6467 contains a PCI interface that allows connecting it to a PCI bus in order to communicate with the other peripherals in the system. The DM6467 PCI has a 32-bit data bus. The operating frequency is specified in the device-specific data sheet. This document shows different ways to interface DM6467 devices with the PCI bus.

### Contents

1	Interface of DM6467 With Three Slave Devices	2
2	Interface of Three DM6467 Devices Without Arbiter	3
3	Interface of Three DM6467 Devices Through IT8208M Extended PCI Arbiter	4
4	Interface of Three DM6467 Devices, External Host and IT8208M Arbiter	5
5	Interface of Five DM6467 Devices Using IT8208M Arbiter	6
6	References	6

## List of Figures

1	Interface of DM6467 With Three Slave Devices	2
2	Interface of Three DM6467 Without Arbiter	3
3	Interface of Three DM6467 With Arbiter	4
4	Interface of Three DM6467 and External Host With Arbiter	5
5	Interface of Five DM6467 Using Arbiter	6

All trademarks are the property of their respective owners.



Interface of DM6467 With Three Slave Devices

## 1 Interface of DM6467 With Three Slave Devices

Figure 1 shows a system that contains one DM6467 as a Master and three target devices. Target0, <u>Target1 and Target2 are slave devices; they do not have control over the PCI bus.</u> On the DM6467, the PCI\_REQ signal is left unconnected and the PCI\_GNT signal is grounded so that the DM6467 will always have access to the PCI bus.



Figure 1. Interface of DM6467 With Three Slave Devices

The DM6467 can access the PCI targets through the master memory-map. The PCI memory space is divided in to 32 windows of 8MB fixed size. Each window can map an 8MB of PCI memory to its corresponding DM6467 PCI memory address by using the PCI Address Substitute Register (PCIADDSUB). The address of three target devices can be mapped using any of the 32 PCI Address Substitute Registers (PCIADDSUB0 – PCIADDSUB31) that may be set through the ARM processor.



www.ti.com

## 2 Interface of Three DM6467 Devices Without Arbiter

Figure 2 shows the interface of three DM6467 devices without an arbiter. It is not possible to have two Masters without an arbiter/bridge; out of three DM6<u>467 devices</u>, one should be the master device and the other two are forced to be slave devices only. The PCI\_REQ signal of the master is left unconnected and the PCI\_GNT signal is grounded. In case of slave devices, the PCI\_REQ signal is left unconnected and the PCI\_GNT signal is tied high through a pullup resistor. In this scenario, the PCI\_GNT signal of all DM6467 are connected to the V<sub>CCP</sub> through the pullup resistor. To take control of the PCI bus, the PCI\_GNT signal of selected DM6467 device should be grounded; this is achieved by using the switch or jumper as shown in Figure 2.



Figure 2. Interface of Three DM6467 Without Arbiter

The master DM6467 device can access the PCI slave memory through the master memory map by mapping to the slave DM6467 memory address through the address substitution registers (PCIADDSUB0 – PCIADDSUB31).

The PCI module on the slave DM6467 device provides full visibility to the master into its memory through six sets of PCI Slave Base Address Translation Registers (PCIBAR0TRL-PCIBAR5TRL).



#### Interface of Three DM6467 Devices Through IT8208M Extended PCI Arbiter

www.ti.com

# 3 Interface of Three DM6467 Devices Through IT8208M Extended PCI Arbiter

Figure 3 shows the interface of three DM6467 devices through the IT8208M extended PCI arbiter. This scenario also applies to other PCI master devices as well. Any of the three DM6467 devices in this configuration can act as either a master or a slave. The IT8208M extended PCI arbiter utilizes one set of PCI\_GNT and PCI\_REQ signals to support each PCI device connected on a secondary side.



Figure 3. Interface of Three DM6467 With Arbiter

If there is no Host connected to the primary side of the extended PCI arbiter, the PCI\_GNT signal is always asserted (connected to the ground) and the PCI\_REQ signal is kept floating as shown in Figure 3. The arbiter uses the rotation arbitration scheme to decide the priority of the requesting devices on the secondary side. For more details on the arbiter, see the *IT8208M Extended PCI Arbiter Data Sheet* that is available at <a href="http://www.ite.com.tw/EN/index.aspx">http://www.ite.com.tw/EN/index.aspx</a>. If any one of the DM6467 devices gets the grant signal, it acts as a master and the remaining two DM6467 devices will be slaves.

The master DM6467 device has access to the other slave DM6467 devices through the master memory-map by mapping memory address through the address substitution registers (PCIADDSUB0 – PCIADDSUB31).

The PCI module on the slave DM6467 device provides full visibility for a master device into its memory through six sets of PCI slave base address translation registers (PCIBAR0TRL-PCIBAR5TRL) and the PCI Base Address Mask Registers (PCIBAR0MSK-PCIBAR5MSK).



www.ti.com

## 4 Interface of Three DM6467 Devices, External Host and IT8208M Arbiter

Figure 4 shows the interface of three DM6467 devices and an external host through the IT8208M extended PCI arbiter. The PCI\_REQ and PCI\_GNT signals from the PCI bus are connected to the primary side of the IT8208M PCI arbiter. The arbiter uses rotation arbitration priority to select the one DM6467 device as a master out of the three DM6467 devices connected.



Figure 4. Interface of Three DM6467 and External Host With Arbiter

The external Host has access to all DM6467 devices. The DM6467 devices have access to the Host and all other devices.

If any one of the DM6467 devices asserts the request signal, then the arbiter asserts the request signal connected to the PCI bus. Once the arbiter receives the grant signal, it asserts the grant signal of the selected DM6467 device. The selected DM6467 device gets control over the PCI bus.

The master DM6467 device has access to the other slave device memory through the master memory-map by mapping memory address through the address substitution registers (PCIADDSUB0 – PCIADDSUB31).

The PCI module on the slave DM6467 device provides full visibility for a master device into the DM6467 memory through six sets of PCI slave base address translation registers (PCIBAR0TRL-PCIBAR5TRL) and the PCI base address mask registers (PCIBAR0MSK-PCIBAR5MSK).



## 5 Interface of Five DM6467 Devices Using IT8208M Arbiter

Figure 5 shows the interface of five DM6467 devices with a PCI bus. This connection is achieved by cascading two IT8208M arbiters as shown in the figure. Addition of more master devices in this system can be achieved by cascading one or more IT8208M arbiters. One IT8208M arbiter is required to add two master devices. This scenario also applies to other master devices as well.



Figure 5. Interface of Five DM6467 Using Arbiter

The master DM6467 device has access to the other device memory through the master memory map by mapping memory address through the address substitution registers (PCIADDRSUB0 – PCIADDRSUB31).

The PCI module on the slave DM6467 device provides full visibility for a master device into its memory through six sets of PCI slave base address translation registers (PCIBAR0TRL-PCIBAR5TRL) and the PCI base address mask registers (PCIBAR0MSK-PCIBAR5MSK).

# 6 References

- TMS320DM646x DMSoC Peripheral Component Interconnect (PCI) User's Guide (SPRUER2)
- PCI Local Bus Specification Revision 2.3 is available at <u>http://www.pcisig.com/specifications/conventional/</u>
- IT8208M Extended PCI Arbiter Preliminary Specification V0.3 is available at http://www.ite.com.tw/EN/index.aspx

## **IMPORTANT NOTICE**

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		Applications	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DLP® Products	www.dlp.com	Broadband	www.ti.com/broadband
DSP	dsp.ti.com	Digital Control	www.ti.com/digitalcontrol
Clocks and Timers	www.ti.com/clocks	Medical	www.ti.com/medical
Interface	interface.ti.com	Military	www.ti.com/military
Logic	logic.ti.com	Optical Networking	www.ti.com/opticalnetwork
Power Mgmt	power.ti.com	Security	www.ti.com/security
Microcontrollers	microcontroller.ti.com	Telephony	www.ti.com/telephony
RFID	www.ti-rfid.com	Video & Imaging	www.ti.com/video
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265 Copyright © 2009, Texas Instruments Incorporated