DP-cPCI-5664

KEY FEATURES AND BENEFITS

• 1553B notice 2 dual redundant BC/RT/MT
• Intelligent DSP processor handles 1553B bus functions
• Single or dual channel
• 64K x 16 shared RAM to communicate between DSP and 1553B
• 512K x 16 dual port RAM to communicate between cPCI bus and processor
• BC frame auto-repeat
• Flexible RT data buffering
• Monitor command filtering
• RT address sequencing
• Sequential emulation of BC, 31RTs and MT
• Flexible interrupt generation
• Programmable time tag resolution
• Inter-message gap time 8µs to 65535µS
• Simulation of the entire 1553B bus without using any external hardware bus simulator
• Hot swap compliant
• 6U cPCI single slot
• Windows 2000 drivers provided
• RT Linux drivers provided
• QNX drivers available

APPLICATIONS

• Simulated testing of a 1553B communication environment
• Automated test equipment
• Checkout system

Dual Channel MIL-STD-1553 BC/RT/MT cPCI Intelligent Module

DESCRIPTION

The DP-cPCI-5664 provides new level of performance and flexibility for MIL-STD-1553B notice 2 in a Compact PCI form factor. It has full intelligent interfacing between a cPCI bus and one / two independent dual redundant MIL-STD-1553B data buses. The 1553B bus functions are fully controlled by a DSP processor. Software controls the operation of the channel as either a 1553 Bus Controller (BC), Remote Terminal (RT), or Bus Monitor (MT).

The board features DDC’s Mini-ACE hybrids, DSP processor, flash memory, static DP RAM. Each channel includes dual transceivers and encoders/decoders, complete 1553B protocol, 64K words of RAM and memory management logic for all three BC/MT/RT Modes.

FUNCTIONAL DESCRIPTION

The DP-cPCI-5664 provides a user friendly interface between the serial MIL-STD-1553B notice 2 bus to cPCI Bus. The initialization of the board is through a dual port RAM of 512Kx16 and FLASH Memory of 128KB. The board features DDC’s Mini-ACE hybrid chip on board which is fully controlled by 32 bit DSP processor optimized for high performance. The DSP processor is used for sequential emulation of BC, 31RTs and MT. The RT address sequencing enables simulation of the whole bus without using any external hardware bus simulator. Also, it has full support for selective message monitor, 31RTs and its sub-addresses.

The DDC’s Mini ACE chip is fully integrated MIL-STD-1553 A/B STANAG 3838 Compliant terminals. Hardware and software are compatible with ACE series, flexible processor/memory interface, 64k x16 shared RAM, Automatic BC retries, programmable BC gap times, programmable illegalization.

The various register configuration defines the operating mode and memory management features. The start/reset register provides various reset and BC/MT start functions. The interrupt mask register enables desired interrupts, with the interrupt priority level being register controlled. The cause of interrupts may be determined by a single read operation on the interrupt status register. The control RT address register is used to program the RT address and miscellaneous functions. The time tag register features programmable resolution and is used to time tag messages in BC or BM modes. The memory base address register supports a software programmable base memory address and controls the background mode operation.
The 64K x 16 static RAM per channel is shared by DSP processor and the 1553B bus. The memory arbitration is handled automatically by the DP-cPCI-5664 board. In addition to storing the 1553B message data, the RAM implements the stacks and look-up tables required for the different modes of operations. The user application interacts with the 1553B bus by programming the required operation into the dual port RAM. The actual communication is carried out under the control of the DSP. This relieves the host processor from the overhead of monitoring the communication.

A descriptive stack is maintained in BC, RT and MT modes. This records the status of each message, the time the message was transmitted or received and contains either the received 1553 command and Data block pointer (in RT or MT mode) or the actual address of the 1553 message block (in BC mode). In the RT mode a look up table is provided to define the addresses of the data blocks to be used when receiving or transmitting messages for the individual sub-addresses.

The board implements Selective message monitor. The DP-cPCI-5664 supports “Plug and Play” installations.

**DP-cPCI-5664 INTELLIGENT FEATURES**

The DP-cPCI-5664 board can simulate multiple RTs in a sequential simulation mode. The 1553B communication on a bus addresses multiple RTs in a sequential manner. Typically, a system simulating multiple RTs employs a non-intelligent 1553B communication module for each RT. By using the DP-cPCI-5664, multiple RTs can be simulated. The DP-cPCI-5664 responds in a pre-programmed fashion for each RT and automatically switches to the next RT ready to receive the message and reply to the same.

The DP-cPCI-5664 provides 512Kx16 shared memory with a host CPU to the host application. This simplifies the programming requirements by allowing more messages to be buffered. Thus the communication link can function on an unattended mode for greater periods of time while the host processor is attending to the computational needs of the host application.

DP-cPCI-5664 is ideally used in Windows environment. For example, traditional 1553B interface when operated as a bus monitor under Windows can loose data due to skipped interface. The DP-cPCI-5664 due to an intelligent DSP control provides bus monitoring even under Windows without loss of data.

The intelligence on-board DP-cPCI-5664 enables the programming of multiple frames on the on-board shared memory. Each system can have intelligent frame timing. Thus a complex communication sequence can be programmed and executed without host CPU intervention.

The DSP controls the host CPU and this is sequential advantage especially when used in the Windows environment.

**INTERFACE TO MIL-STD-1553 BUS**

The interface to the MIL-STD-1553B bus is transformer coupled and provides isolation. The coupling can be suitable for long stub and short stub application. This selection is implemented through a relay switch and it is software controlled.

**SOFTWARE SUPPORT**

The module is supplied complete with device drivers in Windows 2000 and RTLinux. Please contact factory for support in any other operating system such as VxWorks, QNX, INTime, Lynx etc.
## SPECIFICATIONS

### RECEIVER

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Voltage, Transformer coupled, measured on stub</td>
<td>0.2</td>
<td>0.860</td>
<td>10</td>
<td>V&lt;sub&gt;pp&lt;/sub&gt;</td>
</tr>
<tr>
<td>Common Mode Voltage</td>
<td>V&lt;sub&gt;CM&lt;/sub&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TRANSMITTER

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential Output Voltage</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>V&lt;sub&gt;pp&lt;/sub&gt;</td>
</tr>
<tr>
<td>Transformer Coupled, measured on stub</td>
<td>18</td>
<td>21</td>
<td>27</td>
<td>V&lt;sub&gt;pp&lt;/sub&gt;</td>
</tr>
<tr>
<td>Output Noise, Differential (Direct Coupled)</td>
<td>10</td>
<td>mV, p-p</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Offset Voltage, Direct Coupled across 35 Ohms</td>
<td>-90</td>
<td>90</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>Rise / Fall time</td>
<td>100</td>
<td>300</td>
<td>nSec</td>
<td></td>
</tr>
</tbody>
</table>

### POWER SUPPLY REQUIREMENTS

<table>
<thead>
<tr>
<th>Voltage/Tolerances</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5V</td>
<td>4.85</td>
<td>5.0</td>
<td>5.35</td>
<td>V</td>
</tr>
<tr>
<td>+12V</td>
<td>11.4</td>
<td>12.0</td>
<td>12.6</td>
<td>V</td>
</tr>
<tr>
<td>-12V</td>
<td>-13.2</td>
<td>-12.0</td>
<td>-10.8</td>
<td>V</td>
</tr>
</tbody>
</table>

### Current Requirement

- DP-cPCI-5664S: +5V 2.4 A
- DP-cPCI-5664D: +5V 4.9 A
- DP-cPCI-5664D: +12V 30 mA
- DP-cPCI-5664D: -12V 30 mA

### 1553 MESSAGE TIMING

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT Response Time</td>
<td>4</td>
<td>7</td>
<td>µSec</td>
<td></td>
</tr>
<tr>
<td>Completion of CPU write (IBC start-to-end of FIRST BC Message)</td>
<td>2.5</td>
<td>µSec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BC Inter Message Gap Time</td>
<td>9.5</td>
<td>µSec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BC/RT/MT Response Timeout</td>
<td>18.5</td>
<td>µSec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.5 nominal</td>
<td>17.5</td>
<td>18.5</td>
<td>19.5</td>
<td>µSec</td>
</tr>
<tr>
<td>22.5 nominal</td>
<td>21.5</td>
<td>22.5</td>
<td>23.5</td>
<td>µSec</td>
</tr>
<tr>
<td>50.5 nominal</td>
<td>49.5</td>
<td>50.5</td>
<td>51.5</td>
<td>µSec</td>
</tr>
<tr>
<td>128.5 nominal</td>
<td>127</td>
<td>128</td>
<td>129</td>
<td>µSec</td>
</tr>
<tr>
<td>Transmitter Watchdog Timeout</td>
<td>668</td>
<td>µSec</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### cPCI BUS COMPLIANCE

- Meets cPCI specification PICMG 2.0 R 3.0 10/1/1999 and cPCI Hot Swap Specification PICMG 2.1 R 1.0 03/08/1998
- Memory capacity (External) between DSP & 1553B: 64K x 16 Static RAM included
- DSP Processor: ADSP-21061 included
- External RAM between PCI & DSP Processor: 512K x 16 included
- Coupling: Transformer coupled long & short stub configuration.

### CONNECTORS

- Backplane Interface: cPCI Interface
- Facia interface: J1-cPCI 32-bit PCI interface
- Front panel connector: BJ77 connector on facia panel

### MECHANICAL

- Commercial version only
- Backplane Interface: cPCI Interface
- Facia interface: BJ77 connector on facia panel
- 233.35x160.00 mm

### ENVIRONMENT

- Commercial version only
- Factory options specified based on applications
- No. of channels:
  - 0: One Redundant 1553 Channel
  - 1: Two Redundant 1553 Channels
  - 3: Commercial version
BLOCK DIAGRAM OF DP-cPCI-5664

- ACE Interface
- DPPRAM 512Kx16
- DSP AD21061
- Flash MUX
- Flash 128KB
- 64K x 16 RAM
- DDC-ACE BU 61588
- Relay Short Stub/Long Stub
- 1553 Bus
- Ch1
- Ch2
- Ch1
- Ch2
- Ch1
- Ch2
- Channel 1
- Channel 2