

## Introduction

The LMB V10 module is used as the LMB interconnect for Xilinx® FPGA-based embedded processor systems. The LMB is a fast, local bus for connecting the MicroBlaze™ processor instruction and data ports to high-speed peripherals, primarily on-chip block RAM (BRAM).

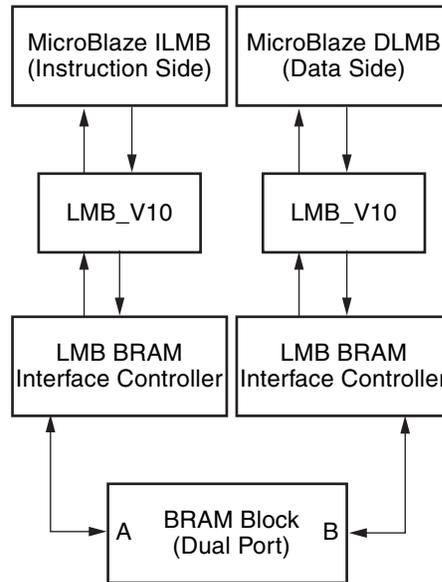
## Features

- Efficient, single master bus (requires no arbiter)
- Separate read and write data buses
- Low FPGA resource utilization

LogiCORE™ IP Facts		
<b>Core Specifics</b>		
See <a href="#">EDK Supported Device Families</a> .		
Version of core	lmb_v10	v1.00a
<b>Resources Used</b>		
	Min	Max
Slices	N/A	N/A
LUTs	0	353
FFs	0	0
Block RAMs	0	0
<b>Provided with Core</b>		
Documentation	Product Specification	
Design File Formats	VHDL	
Constraints File	N/A	
Verification	N/A	
Instantiation Template	N/A	
Reference Designs	None	
<b>Design Tool Requirements</b>		
Xilinx Implementation Tools	See <a href="#">Tools</a> for requirements.	
Verification		
Simulation		
Synthesis		
<b>Support</b>		
Provided by <a href="#">Xilinx, Inc.</a>		

## Functional Description

A MicroBlaze processor system using two LMB V10 modules is shown in [Figure 1](#). This system illustrates the use of both I and D side LMB buses connecting to a dual-ported BRAM Block via separate LMB BRAM interface controllers.



ds445\_01

Figure 1: MicroBlaze Processor System Using Two LMB V10 Modules

## LMB V10 Module I/O Signals

The I/O ports for the LMB V10 module are listed in [Table 1](#).

Table 1: LMB V10 Module I/O Ports

Port Name	MSB:LSB	I/O	Description
LMB_CLK		I	LMB Clock
SYS_Rst		I	External System Reset
LMB_Rst		O	LMB Reset
M_ABus	0:C_LMB_AWIDTH-1	I	Master Address Bus
M_ReadStrobe		I	Master Read Strobe
M_WriteStrobe		I	Master Write Strobe
M_AddrStrobe		I	Master Address Strobe
M_DBus	0:C_LMB_DWIDTH-1	I	Master Databus
M_BE	0:C_LMB_DWIDTH/8-1	I	Master Byte Enables
SI_DBus	0:C_LMB_DWIDTH*C_LMB_NUM_SLAVES-1	O	Slave Data Bus
SI_Ready	0:C_LMB_NUM_SLAVES-1	O	Slave Data Ready

**Table 1: LMB V10 Module I/O Ports (Cont'd)**

Port Name	MSB:LSB	I/O	Description
LMB_ABus	0:C_LMB_AWIDTH-1	O	LMB Address Bus
LMB_ReadStrobe		O	LMB Read Strobe
LMB_WriteStrobe		O	LMB Write Strobe
LMB_AddrStrobe		O	LMB Address Strobe
LMB_ReadDBus	0:C_LMB_DWIDTH-1	O	LMB Read Data Bus
LMB_WriteDBus	0:C_LMB_DWIDTH-1	O	LMB Write Data Bus
LMB_Ready		O	LMB Data Ready
LMB_BE	0:C_LMB_DWIDTH/8-1	O	LMB Byte Enables

## Local Memory Bus Parameters

**Table 2: LMB\_V20 Design Parameters**

Parameter Name	Feature/Description	Allowable Values	Default Value	VHDL Type
C_LMB_NUM_SLAVES	Number of LMB Slaves	1–16	4	integer
C_LMB_AWIDTH	LMB Address Bus Width	32	32	integer
C_LMB_DWIDTH	LMB Data Bus Width	32	32	integer
C_EXT_RESET_HIGH	Level of external reset	0 = Active Low reset 1 = Active High reset	1	integer

## Allowable Parameter Combinations

There are no restrictions on parameter combinations.

## Parameter - Port Dependencies

The LMB V10 module parameter-port dependencies are listed in [Table 3](#).

**Table 3: LMB V10 Module Parameter - Port Dependencies**

Parameter Name	Ports (Port width depends on parameter)
C_LMB_NUM_SLAVES	SI_DBus, SI_Ready
C_LMB_AWIDTH	M_ABus, LMB_ABus
C_LMB_DWIDTH	M_DBus, M_BE, SI_DWIDTH, LMB_ReadDBus, LMB_WriteDBus, LMB_BE
C_EXT_RESET_HIGH	none

## Design Implementation

### Design Tools

The LMB V10 module design is hand written.

To see the synthesis tool used for this device, go to [Tools](#). The NGC netlist output from XST is then input to the Xilinx Alliance tool suite for actual device implementation.

### Target Technology

The target technology is an FPGA listed in [EDK Supported Device Families](#).

## Reference Documents

None

## Revision History

Date	Version	Revision
09/12/02	1.0	Initial Xilinx release.
01/07/03	1.2	Update for SP3.
07/08/03	1.3	Update to new template.
01/26/04	1.4	Updates to TM and copyright.
08/13/04	1.5	Updated for Gmm; updated content format, reviewed and updated trademarks and supported device family listing.
4/4/05	1.6	Updated for EDK 7.1.1 SP1 release; updated trademarks and supported device listing.
8/24/05	1.7	Converted to new DS template.
12/1/05	1.8	Added Spartan@-3E to supported device listing.
2/22/06	1.9	Updated supported devices listing and design tool requirements. Deleted <i>125 MHz operation</i> bullet from Features section.
4/24/09	2.0	Replaced references to supported device families and tool name(s) with hyperlinks to PDF files; Updated trademark information.

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