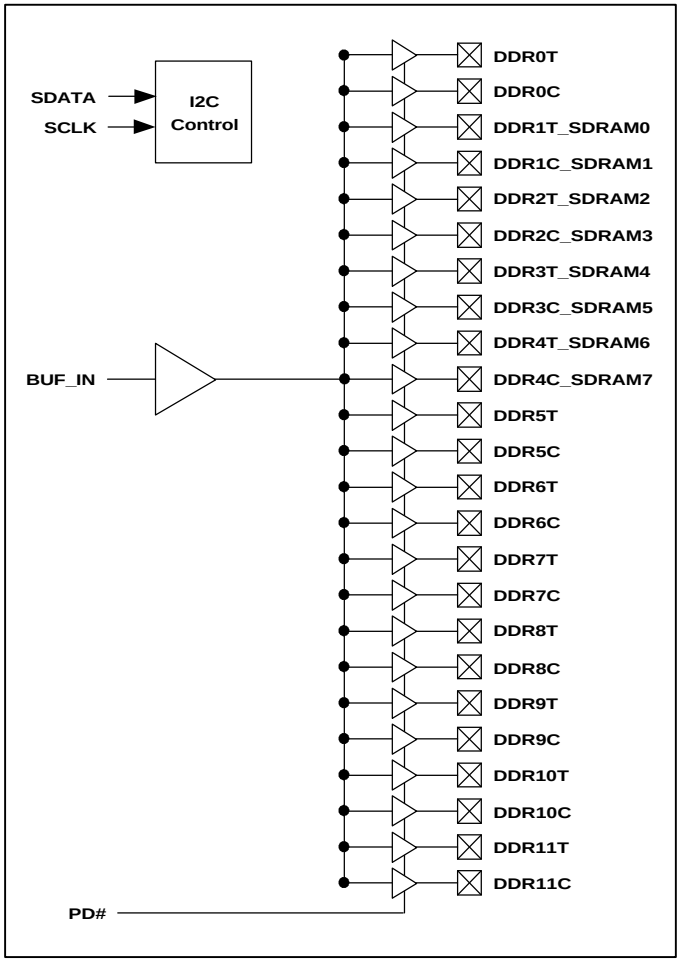
DDR SDRAM Buffer for Desktop PCs with 4 DDR DIMMS

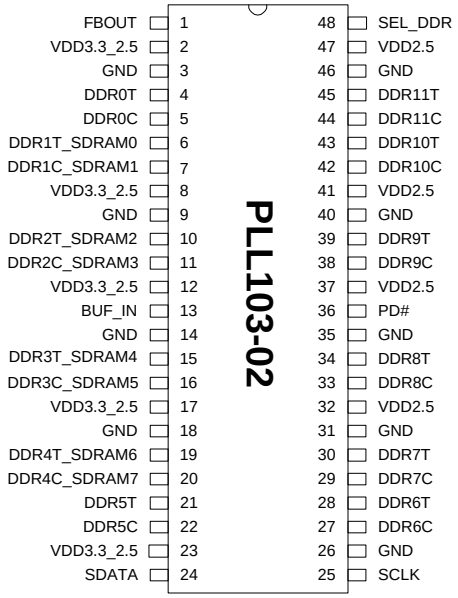
FEATURES

- Generates 24 output buffer from one input.
- Supports up to four DDR DIMMS or 2 SDRAM DIMMS.
- Supports 266MHz DDR SDRAM.
- One additional output for feedback.
- Less than 5ns delay.
- Skew between any outputs is less than 100 ps.
- 2.5V or 3.3V Supply range.
- Enhanced DDR and SDRAM Output Drive selected by I2C.
- Available in 48 pin SSOP.

BLOCK DIAGRAM



PIN CONFIGURATION



Note: #: Active Low

DESCRIPTIONS

The PLL103-02 is designed as a 3.3V/2.5V buffer to distribute high-speed clocks in PC applications. The device has 24 outputs. These outputs can be configured to support four unbuffered DDR DIMMS or to support 2 unbuffered standard SDRAM DIMMS and 2 DDR DIMMS. The PLL103-02 can be used in conjunction with the PLL202-04 or similar clock synthesizer for the VIA Pro 266 chipset.
The PLL103-02 also has an I2C interface, which can enable or disable each output clock. When power up, all output clocks are enabled (has internal pull up).

PIN DESCRIPTIONS

Name	Number	Type	Description
FBOUT	1	O	Feedback clock for chipset. Output voltage depends on VDD3.3_2.5V.
BUF_IN	13	I	Reference input from chipset. 3.3V input for STANDARD SDRAM mode; 2.5V input for DDR-ONLY mode.
PD	36	I	Power Down Control input. When low, it will tri-state all outputs.
SEL_DDR	48	I	Input configure for DDR-ONLY mode or STANDARD SDRAM mode. 1 = DDR-ONLY mode (when VDD3.3_2.5 select 2.5V); 0 = STANDARD SDRAM mode (when VDD3.3_2.5 select 3.3V). In DDR-ONLY mode, pin 4, 5, 6, 7, 10, 11, 15, 16, 19, 20, 21, 22, 27, 28, 29, 30, 33, 34, 38, 39, 42, 43, 44 and 45 will be configured as DDR outputs. In STANDARD SDRAM mode, pin 6, 7, 11, 15, 16, 19 and 20 will be configured as STANDARD SDRAM outputs. Pin 27, 28, 29, 30, 33, 34, 38, 39, 42, 43, 44 and 45 will be configured as DDR outputs. Pin 4, 5, 21 and 22 will be Tri-stated.
DDR[0,5:11]T	4,21,28,30,34, 39,43,45	O	These outputs provide True copies of BUF_IN.
DDR[0,5:11]C	5,22,27,29,33, 38,42,44	O	These outputs provide complementary copies of BUF_IN.
DDR[1:4]T_SDRAM [0,2,4,6]	6,10,15,19	O	When SEL_DDR=1, these outputs provide DDR mode outputs; when SEL_DDR=0, these outputs provide standard SDRAM mode outputs. Voltage swing depends on VDD3.3_2.5.
DDR[1:4]C_SDRAM [1,3,5,7]	7,11,16,20	O	When SEL_DDR=1, these outputs provide complementary copies of BUF_IN; when SEL_DDR=0, these outputs provide standard SDRAM mode outputs. Voltage swing depends on VDD3.3_2.5.
VDD3.3_2.5	2,8,12,17,23	P	When VDD=2.5V, SEL_DDR=1. DDR-ONLY mode is selected; when VDD=3.3V, SEL_DDR=0. STANDARD SDRAM mode is selected.
VDD2.5	32,37,41,47	P	2.5V power supply.
GND	3,9,14,18,26, 31,35,40,46	P	Ground.

Address Assignment	A6	A5	A4	A3	A2	A1	A0	R/W
		1	0	1	0	0	1	_
Receiver/Transmitter	Provides both slave write and							
Data Transfer Rate	Standard mode at 100kbits/s							
	This serial protocol is designed to allow both blocks write and read from the controller. The bytes must be accessed in sequential order from lowest to highest byte. Each byte transferred terminate the transfer. The write or read block both begins with the master sending a slave address and a write condition (0xD2) or a read condition (0xD3). Following the acknowledge of this address byte, in **Write Mode:** the **Command Byte** and **Byte Count Byte must be sent by the master** but ignored by the slave, in **Read Mode:** the **Byte Count Byte** will be **read by the master** then all other **Data Byte**. **Byte Count Byte** default at power-up is = (0x09).							

I2C CONTROL REGISTERS

1. BYTE 6: Outputs Register (1=Enable, 0=Disable)

Bit	Pin#	Default	Description
Bit 7	48	1	SEL_DDR (I2C is ready only, value is set through pin48)
Bit 6	-	0	Enhanced SDRAM Drive. 1 = Enhanced 25%
Bit 5	-	0	Enhanced DDR Drive. 1 = Enhanced 25%
Bit 4	-	0	Reserved
Bit 3	45, 44	1	DDR11T, DDR11C
Bit 2	43, 42	1	DDR10T, DDR10C
Bit 1	39, 38	1	DDR9T, DDR9C
Bit 0	34, 33	1	DDR8T, DDR8C

2. BYTE 7: Outputs Register (1=Enable, 0=Disable)

Bit	Pin#	Default	Description
Bit 7	30, 29	1	DDR7T, DDR7C
Bit 6	28, 27	1	DDR6T, DDR6C
Bit 5	21, 22	1	DDR5T, DDR5C
Bit 4	19, 20	1	DDR4T_SDRAM6, DDR4C_SDRAM7
Bit 3	15, 16	1	DDR3T_SDRAM4, DDR3C_SDRAM5
Bit 2	10, 11	1	DDR2T_SDRAM2, DDR2C_SDRAM3
Bit 1	6, 7	1	DDR1T_SDRAM0, DDR1C_SDRAM1
Bit 0	4, 5	1	DDR0T, DDR0C

ELECTRICAL SPECIFICATIONS

1. Absolute Maximum Ratings

PARAMETERS	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage	V_{DD}	V_{SS}-0.5	7.0	V
Input Voltage, dc	V_I	V_{SS}-0.5	V_{DD}+0.5	V
Output Voltage, dc	V_O	V_{SS}-0.5	V_{DD}+0.5	V
Storage Temperature	T_S	-65	150	°C
Ambient Operating Temperature	T_A	0	70	°C
ESD Voltage			2	KV

Exposure of the device under conditions beyond the limits specified by Maximum Ratings for extended periods may cause permanent damage to the device and affect product reliability. These conditions represent a stress rating only, and functional operations of the device at these or any other conditions above the operational limits noted in this specification is not implied.

2. Operating Conditions

PARAMETERS	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage	$V_{DD3.3}$	3.135	3.465	V
Supply Voltage	$V_{DD2.5}$	2.375	2.625	V
Input Capacitance	C_{IN}		5	pF
Output Capacitance	C_{OUT}		6	pF

3. Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input High Voltage	V_{IH}	All Inputs except I2C	2.0		V_{DD}+0.3	V
Input Low Voltage	V_{IL}	All inputs except I2C	V_{SS}-0.3		0.8	V
Input High Current	I_{IH}	$V_{IN} = V_{DD}$			TBM	uA
Input Low Current	I_{IL}	$V_{IN} = 0$			TBM	uA
Output High Voltage	V_{OH}	IOL = -12mA, VDD = 2.375V	1.7			V
Output Low Voltage	V_{OL}	IOL = 12mA, VDD = 2.375V			0.6	V
Output High Current	I_{OH}	VDD = 2.375V, VOUT=1V	-18	-32		mA
Output Low Current	I_{OL}	VDD = 2.375V, VOUT=1.2V	26	35		mA

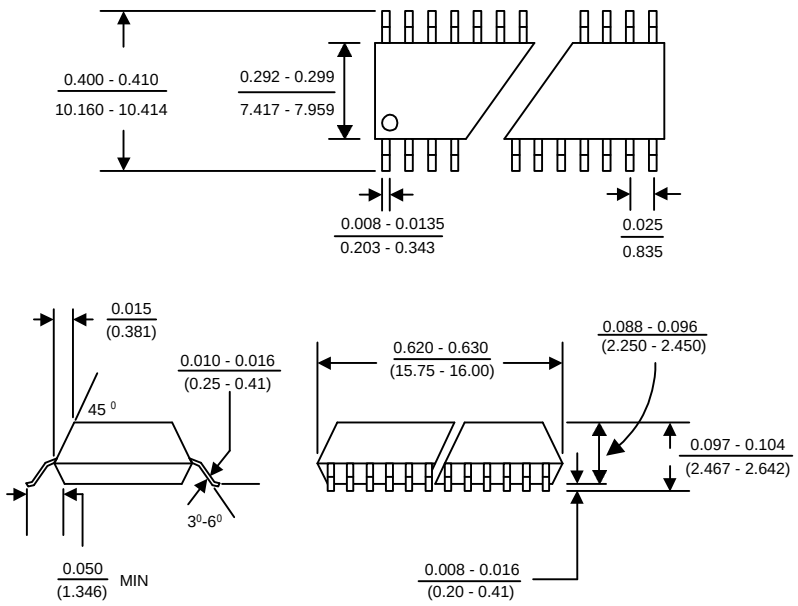
Note: TBM: To be measured

3. Electrical Specifications (Continued)

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Current (DDR-only mode)	I_{DD}	Unloaded outputs, 133MHz			TBM	mA
Supply Current (SDRAM mode)	I_{DD}	Unloaded outputs, 133MHz			TBM	mA
Supply Current	I_{DDS}	PD = 0			TBM	mA
Output Crossing Voltage	V_{OC}		(VDD/2) -0.1	VDD/2	(VDD/2)+ 0.1	V
Output Voltage Swing	V_{OUT}		1.1		VDD-0.4	V
Duty Cycle	D_T	Measured @ 1.5V	45	50	55	%
Max. Operating Frequency			66		170	MHz
Rising Edge Rate	T_{OR}	Measured @ 0.4V ~ 2.4V	1.0	1.5	2.0	V/ns
Falling Edge Rate	T_{OF}	Measured @ 2.4V ~ 0.4V	1.0	1.5	2.0	V/ns
Clock Skew (pin to pin)	T_{SKEW}	All outputs equally loaded			100	ps
Stabilization Time	T_{ST}				0.1	ms

Note: TBM: To be measured

PACKAGE INFORMATION



48PIN SSOP

ORDERING INFORMATION

For part ordering, please contact our Sales Department:

47745 Fremont Blvd., Fremont, CA 94538, USA
Tel: (510) 492-0990 Fax: (510) 492-0991

PART NUMBER

The order number for this device is a combination of the following:
Device number, Package type and Operating temperature range

PLL103-02 X C

PART NUMBER

TEMPERATURATURE
C=COMMERCIAL
M=MILITARY
I=INDUSTRAL

PACKAGE TYPE
X=SSOP