



**W83176R-732**

**W83176G-732**

**Winbond 2 DIMM DDR ZERO DELAY  
BUFFER**

Date: March/22/2006      Revision: 1.1

## W83176R-732/W83176G-732



### W83176R-732/W83176G-732 Data Sheet Revision History

	PAGES	DATES	VERSION	WEB VERSION	MAIN CONTENTS
1	n.a.	12/18/03	0.5	n.a.	First published preliminary version
2		12/15/04	1.0	1.0	Publish on Website
3		03/22/2006	1.1	1.1	Add lead free part
4					
5					
6					
7					
8					
9					
10					

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## 1. GENERAL DESCRIPTION

The W83176R-732 is a 2.5V Zero-delay D.D.R. Clock buffer designed for SiS chipset. W83176R-732 can support 2 D.D.R. DRAM DIMMs.

The W83176R-732 provides I<sup>2</sup>C serial bus interface to program the registers to enable or disable each clock outputs. The W83176R-732 accepts a reference clock as its input and runs on 2.5V supply.

## 2. PRODUCT FEATURES

- Zero-delay clock outputs
- Feedback pins for synchronous
- Supports up to 2 D.D.R. DIMMs
- One pairs of additional outputs for feedback
- Low Skew outputs (< 100ps)
- Supports 400MHz D.D.R. SDRAM
- I<sup>2</sup>C 2-Wire serial interface and supports Byte or Block Date RW
- 28-pin SSOP package

## 3. PIN CONFIGURATION

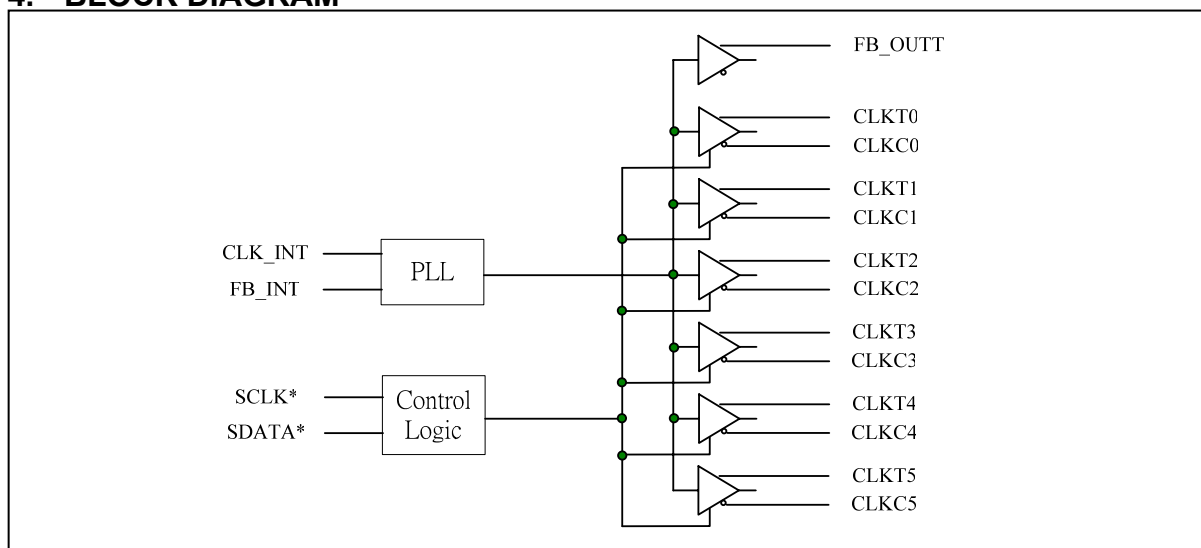
CLKC0	1 ●	28	GND
CLKT0	2	27	CLKC5
VDD	3	26	CLKT5
CLKT1	4	25	CLKC4
CLKC1	5	24	CLKT4
GND	6	23	VDD
SCLK*	7	22	SDATA*
CLK_INT	8	21	NC
NC	9	20	FB_INT
AVDD	10	19	FB_OUT1
GND	11	18	NC
VDD	12	17	CLKT3
CLKT2	13	16	CLKC3
CLKC2	14	15	GND

\*: Internal pull-up resistor 120K to VDD

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## 4. BLOCK DIAGRAM



## 5. PIN DESCRIPTION

BUFFER TYPE SYMBOL	DESCRIPTION
IN	Input
OUT	Output
I/O	Bi-directional Pin
*	Internal 120kΩ pull-up
NC	Not connect

### 5.1 Clock Outputs

PIN	PIN NAME	TYPE	DESCRIPTION
27,25,16,14,5,1	CLKC [5:0]	OUT	Complementary Clocks of differential pair outputs
26,24,17,13,4,2	CLKT [5:0]	OUT	True Clocks of differential pair outputs
22	SDATA *	I/O	Serial data of I <sup>2</sup> C 2-wire control interface Internal pull-up resistor 120K to Vdd
7	SCLK *	IN	Serial clock of I <sup>2</sup> C 2-wire control interface Internal pull-up resistor 120K to Vdd
8	CLK_INT	IN	True reference clock input, 3.3V tolerant input
9,18,21	N/C	NC	Not connected
19	FB_OUTT	OUT	True Feedback output, dedicated for external feedback. It switches at the same frequency as the CLK. This output must be wired to FB_INT.
20	FB_INT	IN	True Feedback input, provides feedback signal to the internal PLL for synchronization with CLK_INT to eliminate phase error.

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### 5.2 Power Pins

PIN	PIN NAME	DESCRIPTION
6,11,15,28	GND	Ground
3,12,23	VDD	Power Supply 2.5V
10	AVDD	Analog power supply, 2.5V

## 6. REGISTER 0 ~ REGISTER 4 RESERVED

### 6.1 Register 5: Output Control (1 = Active, 0 = Inactive) (Default =FFh)

BIT	@POWERUP	PIN	DESCRIPTION
7	1	1,2	CLKC0, CLKT0 (Active / Inactive)
6	1	5,4	CLKC1, CLKT1 (Active / Inactive)
5	1	-	Reserved
4	1	-	Reserved
3	1	14,13	CLKC2, CLKT2 (Active / Inactive)
2	1	16,17	CLKC3, CLKT3 (Active / Inactive)
1	1	-	Reserved
0	1	-	Reserved

### 6.2 Register 6: Output Control (1 = active, 0 = inactive) (Default =FFh)

BIT	@POWERUP	PIN	DESCRIPTION
7	1	-	Reserved
6	1	-	Reserved
5	1	-	Reserved
4	1	-	Reserved
3	1	25,24	CLKC4, CLKT4 (Active / Inactive)
2	1	-	Reserved
1	1	27,26	CLKC5, CLKT5 (Active / Inactive)
0	1	-	Reserved

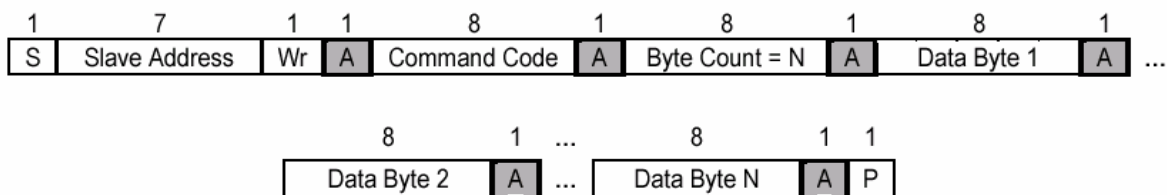
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## 7. ACCESS INTERFACE

The W83176R-732 provides I<sup>2</sup>C Serial Bus for microprocessor to read/write internal registers. In the W83176R-732 is provided Block Read/Block Write and Byte-Data Read/Write protocol. The I<sup>2</sup>C write address is defined at 0xD4. The I<sup>2</sup>C read address is defined at 0xD5.

### 7.1 Block Write protocol

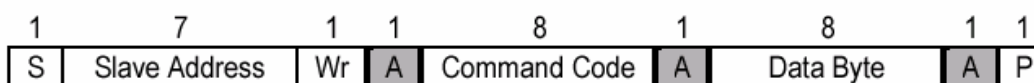


### 7.2 Block Read protocol

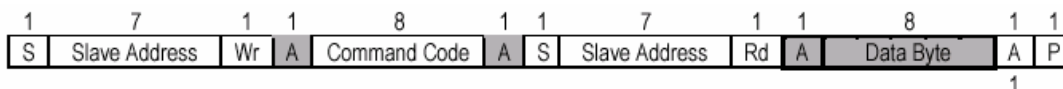


## In block mode, the command code must filled '00h'

### 7.3 Byte Write protocol



### 7.4 Byte Read protocol



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## 8. SPECIFICATIONS

### 8.1 ABSOLUTE MAXIMUM RATINGS

Stresses greater than those listed in this table may cause permanent damage to the device. Precautions should be taken to avoid application of any voltage higher than the maximum rated voltages to this circuit. Maximum conditions for extended periods may affect reliability. Unused inputs must always be tied to an appropriate logic voltage level (Ground or VDD).

SYMBOL	PARAMETER	RATING
VDD, AVDD	Voltage on any pin with respect to GND	- 0.5 V to + 3.6 V
T <sub>STG</sub>	Storage Temperature	- 65°C to + 150°C
T <sub>B</sub>	Ambient Temperature	- 55°C to + 125°C
T <sub>A</sub>	Operating Temperature	0°C to + 70°C

### 8.2 AC CHARACTERISTICS

<b>VDD = AVDD = 2.5V ± 5 %, T<sub>A</sub> = 0°C to +70°C, Test load = 10 pF</b>						
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT S	TEST CONDITIONS
Operating clock frequency	F <sub>IN</sub>	100		200	MHz	
Input Clock Duty Cycle	D <sub>tin</sub>	40		60	%	
Dynamic Supply Current	I <sub>dd</sub>			300	mA	F <sub>in</sub> =100 to 200Mhz
Cycle to Cycle Jitter	C-Cjitter			200	ps	F <sub>out</sub> =100 to 200Mhz
Output to Output Skew	T <sub>skew</sub>			100	ps	F <sub>out</sub> =100 to 200Mhz
Output clock Rise time	T <sub>or</sub>	650		950	ps	F <sub>out</sub> =100 to 200Mhz
Output clock Fall time	T <sub>of</sub>	650		950	ps	F <sub>out</sub> =100 to 200Mhz
Output clock Duty Cycle	D <sub>tot</sub>	45		55	%	F <sub>out</sub> =100 to 200Mhz
Output differential-pair crossing voltag	V <sub>oc</sub>	(V <sub>dd</sub> /2) -0.2	V <sub>dd</sub> /2	(V <sub>dd</sub> /2) + 0.2	V	F <sub>out</sub> =100 to 200Mhz



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### 8.3 DC CHARACTERISTICS

<b><math>V_{dd} = AV_{DD} = 2.5V \pm 5\%</math>, <math>T_A = 0^{\circ}C</math> to <math>+70^{\circ}C</math></b>						
<b>PARAMETER</b>	<b>SYMBOL</b>	<b>MIN</b>	<b>TYP</b>	<b>MAX</b>	<b>UNITS</b>	<b>TEST CONDITIONS</b>
SDATA, SCLK Input Low Voltage	$SV_{IL}$			1.0	$V_{dc}$	
SDATA, SCLK Input High Voltage	$SV_{IH}$	2.2			$V_{dc}$	
CLKIN, FBIN Input Voltage Low	$V_{IL}$			0.4	$V_{dc}$	Fin=100 to 200Mhz
<b><math>V_{dd} = AV_{DD} = 2.5V \pm 5\%</math>, <math>T_A = 0^{\circ}C</math> to <math>+70^{\circ}C</math></b>						
<b>PARAMETER</b>	<b>SYMBOL</b>	<b>MIN</b>	<b>TYP</b>	<b>MAX</b>	<b>UNITS</b>	<b>TEST CONDITIONS</b>
CLKIN, FBIN Input Voltage High	$V_{IH}$	2.1			$V_{dc}$	Fin=100 to 200Mhz
Input Pin Capacitance	$C_{IN}$			5	pF	
Output Pin Capacitance	$C_{OUT}$			6	pF	
Input Pin Inductance	$L_{IN}$			7	nH	

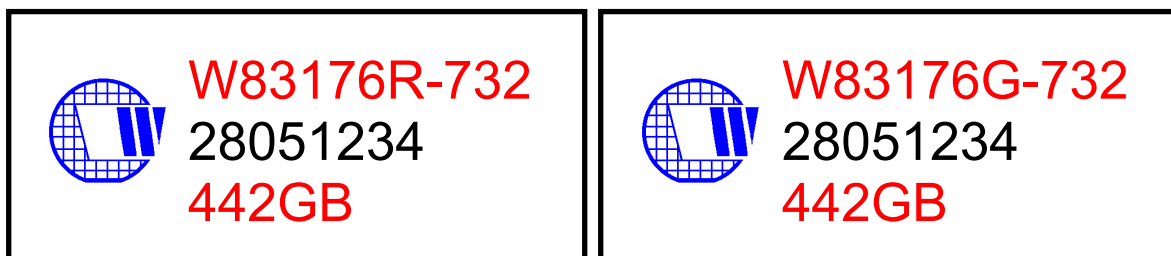
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### 9. ORDERING INFORMATION

Part Number	Package Type	Production Flow
W83176R-732	28 PIN SSOP	Commercial, 0°C to +70°C
W83176G-732	28 PIN SSOP (Lead free package)	Commercial, 0°C to +70°C

### 10. HOW TO READ THE TOP MARKING



1st line: Winbond logo and the type number:

Normal package: W83176R-732, Lead free package:W83176G-732

2nd line: Tracking code 2 8051234

2: wafers manufactured in Winbond FAB 2

8051234: wafer production series lot number

3rd line: Tracking code 342 G B

442: packages made in '2003, week 42

G: assembly house ID; O means OSE, G means GR

B: IC revision

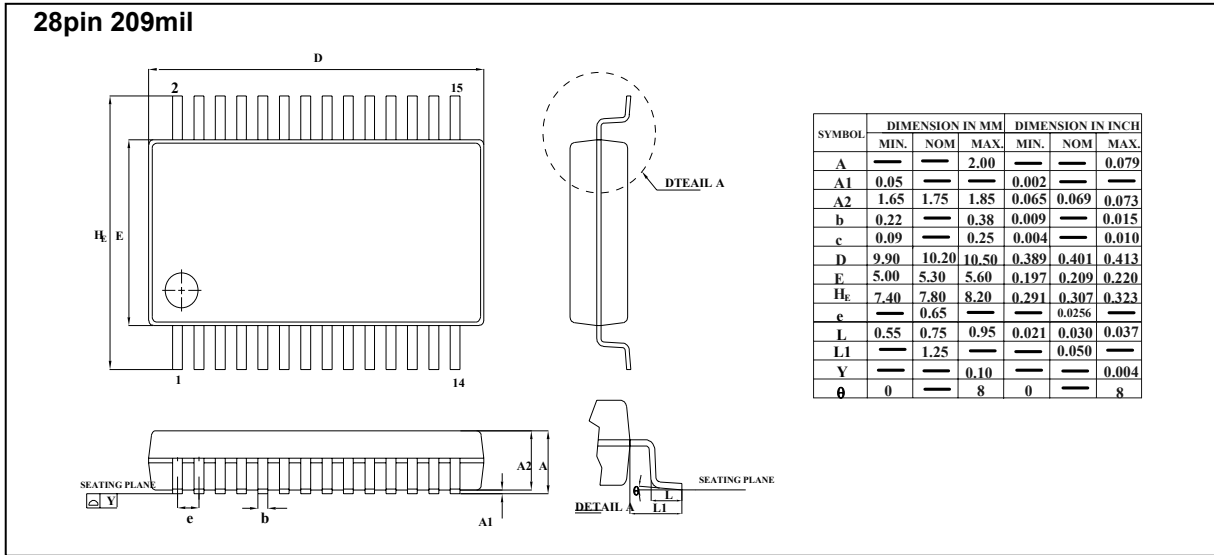
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## 2 DIMM DDR ZERO DELAY BUFFER FOR SIS CHIPSET

### 11. PACKAGE DRAWING AND DIMENSIONS



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