



100MHZ 2-DIMM SDRAM BUFFER FOR NOTEBOOK

1.0 GENERAL DESCRIPTION

The W83L177R is a 10 outputs SDRAM clock buffer for 2-DIMMs models incorporate with W83L197R-16 which is the clock synthesizer especially for the 100MHz models such as Intel BX chipsets.(Refer the datasheet fo Winbond W83L197R-16)

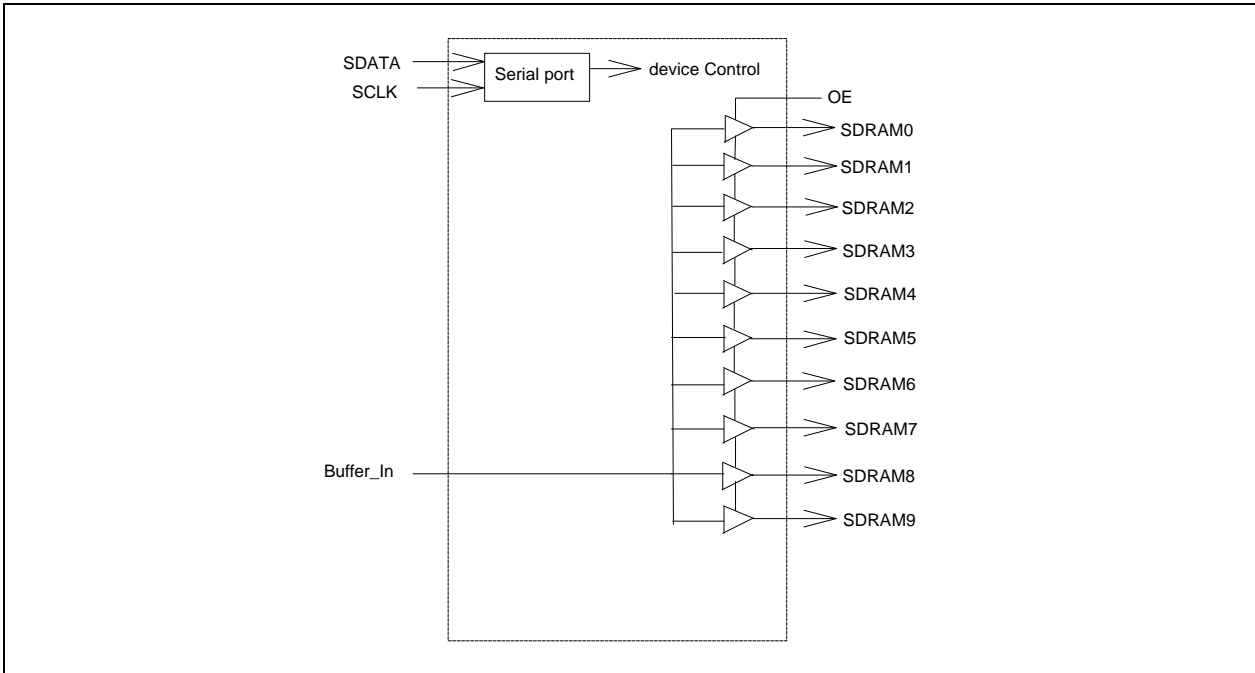
The W83L177R receives the clock from chipset by the Buffer_In pin and provides almost zero-delay (less than 4ns propagation delay) SDRAM buffer outputs for the 10 SDRAM clocks which are synchronous with the CPU clock outputs provided by W83L197R-16. The clock skew between any two clock outputs is less than 250ps and the output buffer impedance is about 15 ohms.

The W83L177R also provides I²C serial bus interface to program the registers to enable or disable each SDRAM clock outputs.

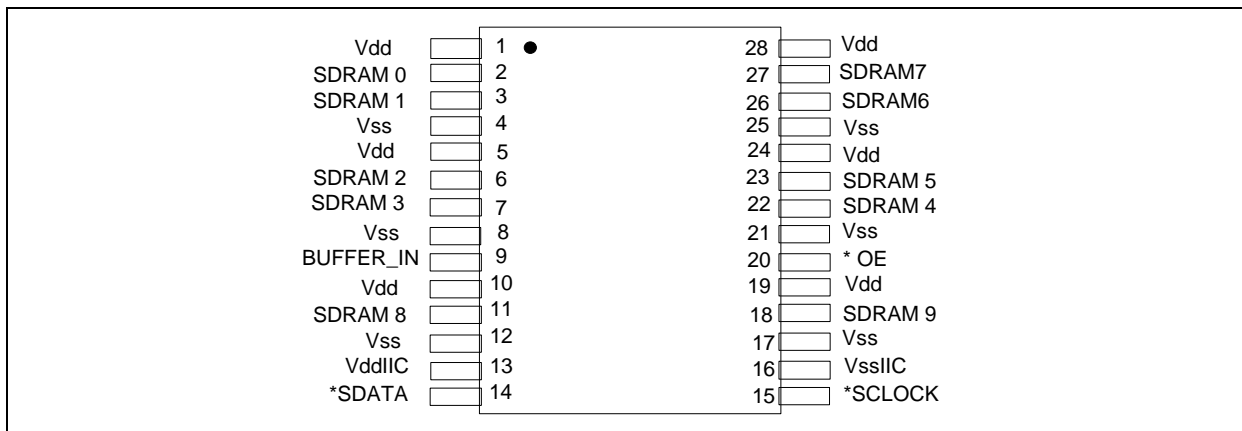
2.0 PRODUCT FEATURES

-
- 10 SDRAM clocks for 2-DIMMs
- Clock skew less than 250ps
- Almost none delay Buffer-in controlling SDRAM clocks(< 4ns propagation delay)
- I²C 2-wire serial interface
- Programmable registers to enable/stop each output
- Incorporate with W83L197R-16
- 28pin-SOP package (209mil)

3.0 BLOCK DIAGRAM



4.0 PIN CONFIGURATION



5.0 PIN DESCRIPTION

IN - Input

OUT - Output

I/O - Bi-directional Pin

* - Internal 250kΩ pull-up

| SYMBOL | PIN | I/O | FUNCTION |
|--------------|-------------------------------|-----|--|
| SDRAM [0:9] | 2,3,6,7,11,18, 22,23,26,27 | O | SDRAM clock outputs which have the same frequency as CPU clocks. |
| *SDATA | 14 | I/O | Serial data of I ² C 2-wire control interface |
| *SDCLK | 15 | IN | Serial clock of I ² C 2-wire control interface |
| *OE | 20 | IN | Internal 250K ohm pull-up resistor. Tri-states outputs when LOW. |
| BUFFER_IN | 9 | IN | Clock Input from the chipset |
| VDDIIC | 13 | | Power supply for I2C core logic, 3.3 V supply |
| VSSIIC | 16 | | Ground for I2C core logic |
| Vdd | 1,5,10,19,24, 28 | | Power supply |
| Vss | 4,8,12,17,21, 25 | | Circuit Ground |

6.0 FUNTION DESCRIPTION

6.1 2-WIRE I²C CONTROL INTERFACE

The clock generator is a slave I2C component which can be read back the data stored in the latches for verification. All proceeding bytes must be sent to change one of the control bytes. The 2-wire control interface allows each clock output individually enabled or disabled. On power up, the W83L177R initializes with default register settings, and then it's optional to use the 2-wire control interface.

The SDATA signal only changes when the SDCLK signal is low, and is stable when SDCLK is high during normal data transfer. There are only two exceptions. One is a high-to-low transition on SDATA while SDCLK is high used to indicate the beginning of a data transfer cycle. The other is a low-to-high transition on SDATA while SDCLK is high used to indicate the end of a data transfer cycle. Data is always sent as complete 8-bit bytes followed by an acknowledge generated.

Byte writing starts with a start condition followed by 7-bit slave address and [1101 0010], command code checking [0000 0000], and byte count checking. After successful reception of each byte, an acknowledge (low) on the SDATA wire will be generated by the clock chip. Controller can start to write to internal I²C registers after the string of data. The sequence order is as follows:

Bytes sequence order for I²C controller :

| | | | | | | |
|----------------------------|-----|---------------------------|-----|-------------------------|-----|-------------------------|
| Clock Address A(6:0) & R/W | Ack | 8 bits dummy Command code | Ack | 8 bits dummy Byte count | Ack | Byte0,1,2... until Stop |
|----------------------------|-----|---------------------------|-----|-------------------------|-----|-------------------------|

Set R/W to 1 when read back the data sequence is as follows :

| | | | | | | |
|----------------------------|-----|--------|-----|--------|-----|---------------------------|
| Clock Address A(6:0) & R/W | Ack | Byte 0 | Ack | Byte 1 | Ack | Byte2, 3, 4... until Stop |
|----------------------------|-----|--------|-----|--------|-----|---------------------------|

6.2 SERIAL CONTROL REGISTERS

The Pin column lists the affected pin number and the @PowerUp column gives the state at true power up. Registers are set to the values shown only on true power up. "Command Code" byte and "Byte Count" byte must be sent following the acknowledge of the Address Byte. Although the data (bits) in these two bytes are considered "don't care", they must be sent and will be acknowledge. After that, the below described sequence (Register 0, Register 1, Register 2,) will be valid and acknowledged.

6.2.1 Register 0: (1 = Active, 0 = Inactive)

| Bit | @PowerUp | Pin | Description |
|-----|----------|-----|----------------------------|
| 7 | - | - | Reserved |
| 6 | - | - | Reserved |
| 5 | - | - | Reserved |
| 4 | - | - | Reserved |
| 3 | 1 | 7 | SDRAM3 (Active / Inactive) |
| 2 | 1 | 6 | SDRAM2 (Active / Inactive) |
| 1 | 1 | 3 | SDRAM1 (Active / Inactive) |
| 0 | 1 | 2 | SDRAM0 (Active / Inactive) |

6.2.2 Register 1: (1 = Active, 0 = Inactive)

| Bit | @PowerUp | Pin | Description |
|-----|----------|-----|----------------------------|
| 7 | 1 | 27 | SDRAM7 (Active / Inactive) |
| 6 | 1 | 26 | SDRAM6 (Active / Inactive) |
| 5 | 1 | 23 | SDRAM5 (Active / Inactive) |
| 4 | 1 | 22 | SDRAM4 (Active / Inactive) |
| 3 | - | - | Reserved |
| 2 | - | - | Reserved |
| 1 | - | - | Reserved |
| 0 | - | - | Reserved |

6.2.3 Register 2: (1 = Active, 0 = Inactive)

| Bit | @PowerUp | Pin | Description |
|-----|----------|-----|----------------------------|
| 7 | 1 | 18 | SDRAM9 (Active / Inactive) |
| 6 | 1 | 11 | SDRAM8 (Active / Inactive) |
| 5 | - | - | Reserved |
| 4 | - | - | Reserved |
| 3 | - | - | Reserved |
| 2 | - | - | Reserved |
| 1 | - | - | Reserved |
| 0 | - | - | Reserved |

7.0 SPECIFICATIONS

7.1 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 , V _{IN} | Voltage on any pin with respect to GND | - 0.5 V to + 7.0 V |
| T _{STG} | Storage Temperature | - 65°C to + 150°C |
| T _B | Ambient Temperature | - 55°C to + 125°C |
| T _A | Operating Temperature | 0°C to + 70°C |

7.2 AC CHARACTERISTICS

| <i>Vdd = 3.3V - 5% , T_A = 0°C to +70°C , Test load = 30 pF</i> | | | | | | |
|---|------------------|-----|-----|------|-------|----------------------------|
| Parameter | Symbol | Min | Typ | Max | Units | Test Conditions |
| Input frequency | f _{IN} | 0 | | 150 | MHz | |
| Output Rise Time | t _R | 1.5 | | 4.0 | V/ns | Measured from 0.4V to 2.4V |
| Output Fall Time | t _F | 1.5 | | 4.0 | V/ns | Measured from 0.4V to 2.4V |
| Output Skew, Rising Edges | t _{SR} | | | 250 | ps | |
| Output Skew, Falling Edges | t _{SF} | | | 250 | ps | |
| Output Enable Time | t _{EN} | 1.0 | | 8.0 | ns | |
| Output Disable Time | t _{DIS} | 1.0 | | 8.0 | ns | |
| Rising Edge Propagation Delay | t _{PR} | 1.0 | | <4.0 | ns | |
| Falling Edge Propagation Delay | t _{PF} | 1.0 | | <4.0 | ns | |
| Duty Cycle | t _D | 45 | | 55 | % | Measure at 1.5V |
| AC Output Impedance | Z _O | | 15 | | Ω | |

7.3 DC CHARACTERISTICS

| <i>V_{dd} = 3.3V - 5 %, T_A = 0° C to +70° C</i> | | | | | | |
|--|------------------|----------------------|-----|----------------------|------------------|-----------------------|
| Parameter | Symbol | Min | Typ | Max | Units | Test Conditions |
| Input Low Voltage | V _{IL} | V _{ss} -0.3 | | 0.8 | V _{dc} | |
| Input High Voltage | V _{IH} | 2.0 | | V _{dd} +0.5 | V _{dc} | |
| Input Leakage Current, BUFFER_IN | I _{IL} | -5 | | +5 | μA | |
| Input Leakage Current | I _{IL} | -20 | | +5 | μA | |
| Output Low Voltage | V _{OL} | | | 50 | mV _{dc} | I _{OL} =1mA |
| Output High Voltage | V _{OH} | 3.1 | | | V _{dc} | I _{OH} =-1mA |
| Output Low Current | I _{OL} | 65 | 100 | 160 | mA | V _{OL} =1.5V |
| Output High Current | I _{OH} | 70 | 110 | 185 | mA | V _{OH} =1.5V |
| Input Pin Capacitance | C _{IN} | | | 5 | pF | |
| Output Pin Capacitance | C _{OUT} | | | 6 | pF | |
| Input Pin Inductance | L _{IN} | | | 7 | nH | |

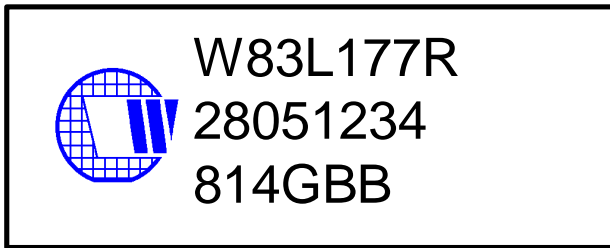


PRELIMINARY

8.0 ORDERING INFORMATION

| Part Number | Package Type | Production Flow |
|-------------|--------------|--------------------------|
| W83L177R | 28 PIN SOP | Commercial, 0°C to +70°C |

9.0 HOW TO READ THE TOP MARKING



1st line: Winbond logo and the type number: W83L177R

2nd line: Tracking code 2 8051234

2: wafers manufactured in Winbond FAB 2

8051234: wafer production series lot number

3rd line: Tracking code 814 G B B

814: packages made in '98, week 14

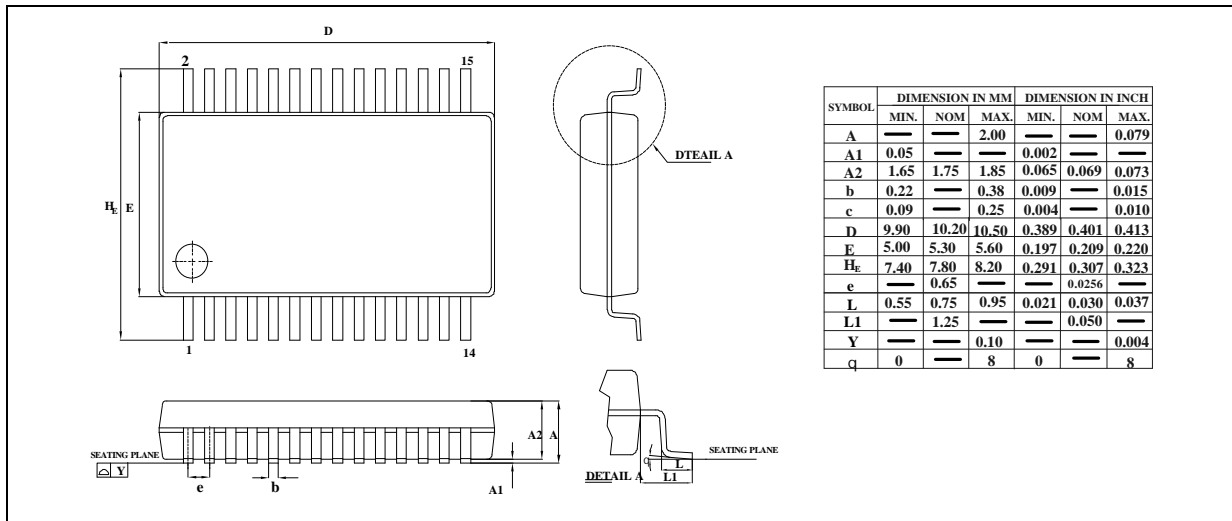
G: assembly house ID; A means ASE, S means SPIL, G means GR

BB: IC revision

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10.0 PACKAGE DRAWING AND DIMENSIONS

28-SOP



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