



**Winbond**  
**Bus Termination Regulator**  
**W83310S-R/N**

Date: April 13, 2005      Revision: 1.0



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## 1. GENERAL DESCRIPTION

The W83310S-R/N is a linear regulator which provides achieves 1.5Amp bi-directional sinking and driving capability for DDR SDRAM bus terminator application. The chip simply implement a stable power supply which can track half of input power dynamically for bus terminator with a single chip; that is the chip integrates two power MOSFETs. There is no any external power device needed. The W83310S-R/N is promoted with small footprint 8-SOP 150mil package. With W83301S-R/N design, a high integration, high performance, and cost-effective solution is promoted.

## 2. FEATURES

- ❖ Regulates a bi-directional power with driving and sinking capability
- ❖ Provides achieve 1.5Amp driving and sinking current
- ❖ Power MOSFET integrated
- ❖ Low external component count
- ❖ Low output voltage offset
- ❖ Operates with +5V,+3.3V and +2.5V power
- ❖ Small package
- ❖ Low cost and easy to use

## 3. APPLICATIONS

- ❖ DDR Bus Termination Regulator
- ❖ Active Termination Bus
- ❖ SSTL-2
- ❖ SSTL-3



## 4. PIN CONFIGURATION AND DESCRIPTION

### - W83310S-R



| SYMBOL | PIN | FUNCTION                           |
|--------|-----|------------------------------------|
| VIN    | 1   | Power input pin.                   |
| GND    | 2   | Ground.                            |
| VREF   | 3   | Reference voltage and Chip enable. |
| VOUT   | 4   | Output voltage.                    |
| VCNTL  | 5   | Gate drive voltage.                |
| VCNTL  | 6   | Gate drive voltage.                |
| VCNTL  | 7   | Gate drive voltage.                |
| VCNTL  | 8   | Gate drive voltage.                |

### - W83310S-N

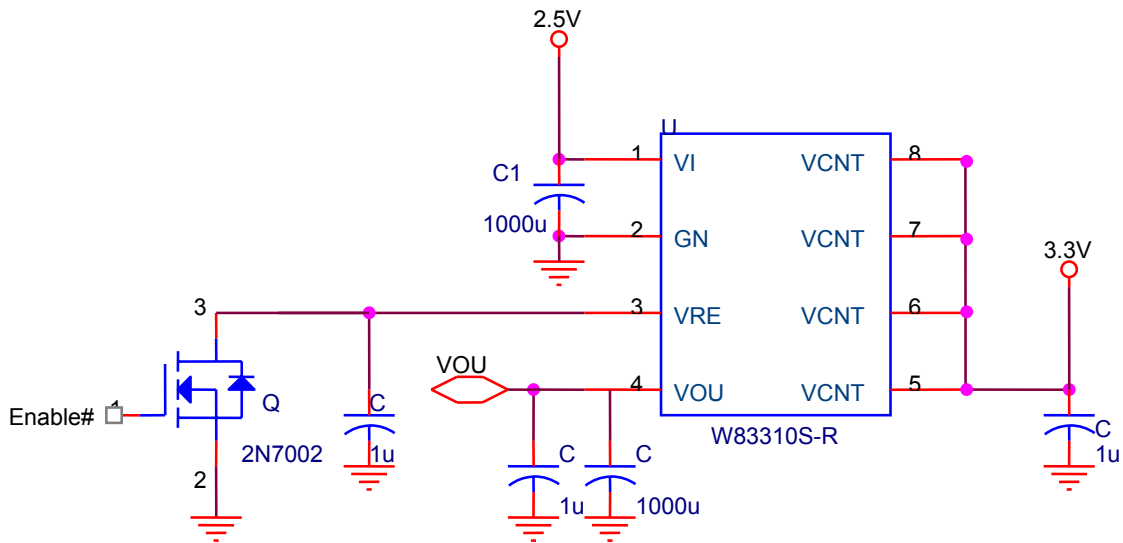




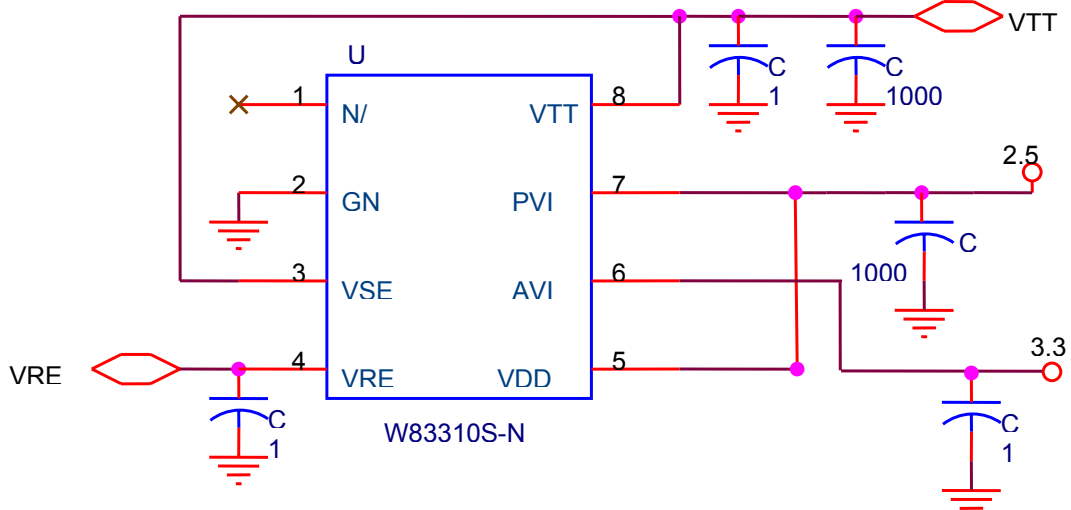
| SYMBOL | PIN | FUNCTION                                                |
|--------|-----|---------------------------------------------------------|
| N/C    | 1   | No internal connection.                                 |
| GND    | 2   | Ground.                                                 |
| VSENSE | 3   | Feedback pin for regulating VTT.                        |
| VREF   | 4   | Internal reference voltage of VDDQ/2.                   |
| VDDQ   | 5   | Input for internal reference equal to VDDQ/2.           |
| AVIN   | 6   | Analog input pin.                                       |
| PVIN   | 7   | Power input pin.                                        |
| VTT    | 8   | Output voltage for connection to termination resistors. |

5. APPLICATION CIRCUIT

- W83310S-R

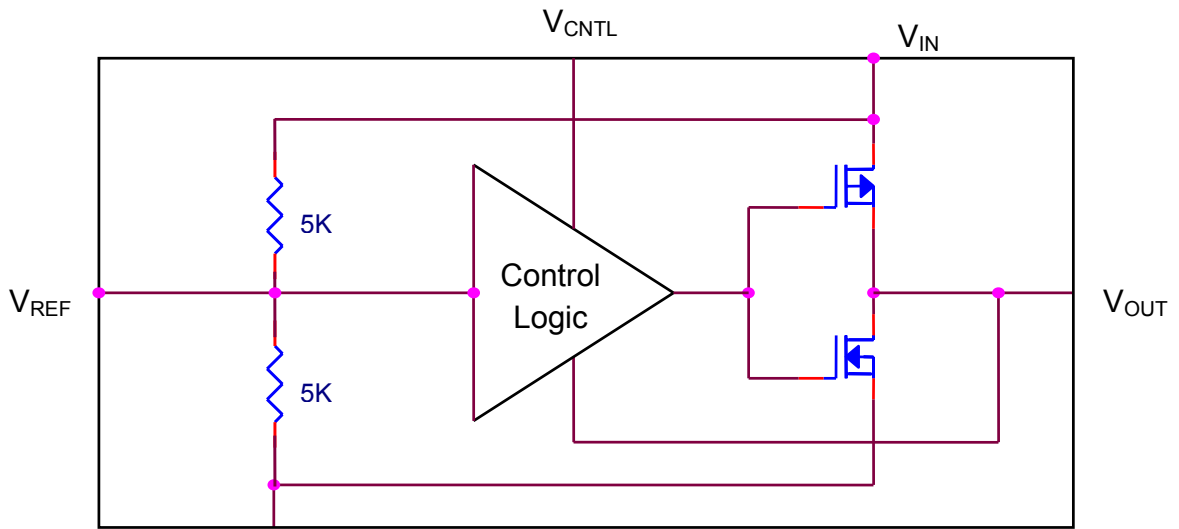


**- W83310S-N**

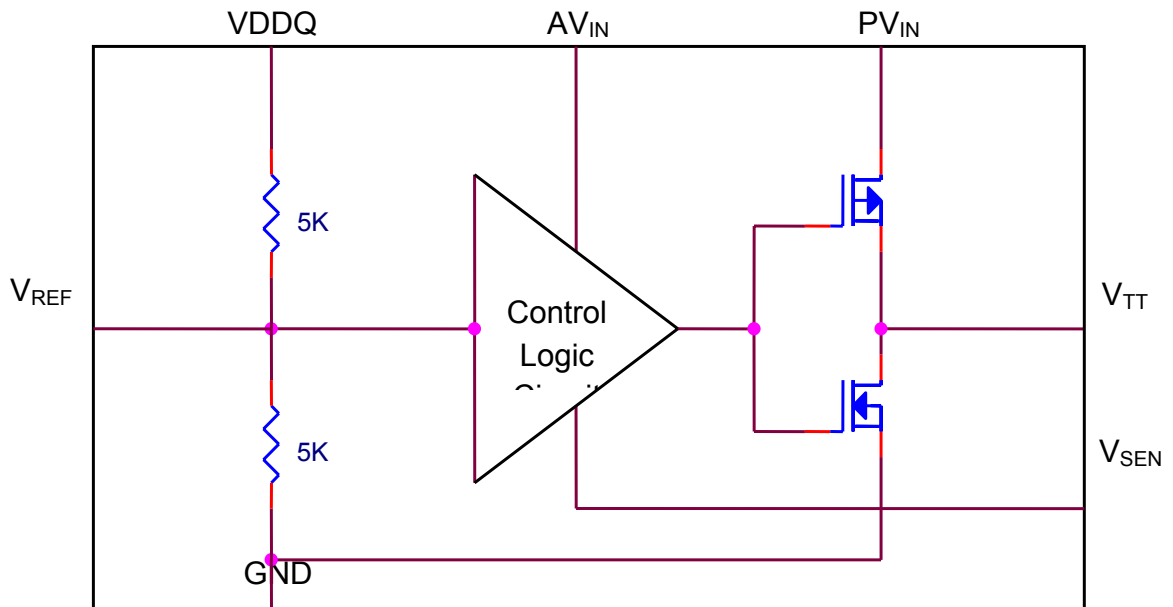


**6. INTERNAL BLOCK DIAGRAM**

**- W83310S-R**



**- W83310S-N**





7. ELECTRICAL CHARACTERISTICS

AC CHARACTERISTICS

| W83310S-R                                                                                                                                                       |                         |     |     |     |       |                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|-----|-----|-------|----------------------------------------------|
| <i>V<sub>IN</sub></i> =2.5V, <i>V<sub>CNTL</sub></i> =3.3V, <i>V<sub>REF</sub></i> =1.25V, <i>C<sub>out</sub></i> =100uF, <i>T<sub>A</sub></i> = 0 °C to +70 °C |                         |     |     |     |       |                                              |
| Parameter                                                                                                                                                       | Symbol                  | Min | Typ | Max | Units | Test Conditions                              |
| Output Offset Voltage                                                                                                                                           | <i>V<sub>OS</sub></i>   | -5  | 0   | +5  | mV    | <i>I<sub>OUT</sub></i> =0A                   |
| Load Regulation                                                                                                                                                 |                         |     | 0.8 |     | %     | Loading:<br>0A→1.5A                          |
|                                                                                                                                                                 |                         |     | 0.8 |     |       | Loading:<br>0A→-1.5A                         |
| Input Voltage Range                                                                                                                                             | <i>V<sub>IN</sub></i>   |     | 2.5 |     | V     |                                              |
|                                                                                                                                                                 | <i>V<sub>CNTL</sub></i> |     | 3.3 |     |       |                                              |
| Operating Current of <i>V<sub>CNTL</sub></i>                                                                                                                    | <i>I<sub>CNTL</sub></i> |     | 0.5 | 1   | mA    | No Load( <i>I<sub>OUT</sub></i> =0A)         |
| Shutdown Threshold Trigger                                                                                                                                      |                         | 0.4 |     |     | V     | Output=High                                  |
|                                                                                                                                                                 |                         |     |     | 0.1 | V     | Output=Low                                   |
| Shutdown Current                                                                                                                                                | <i>I<sub>SHDN</sub></i> |     | 10  |     | uA    | <i>V<sub>REF</sub></i> <0.2V<br>Loading=0.7A |

Note: Load regulation is tested with a 10ms pulse current and measuring *V<sub>OUT</sub>*.

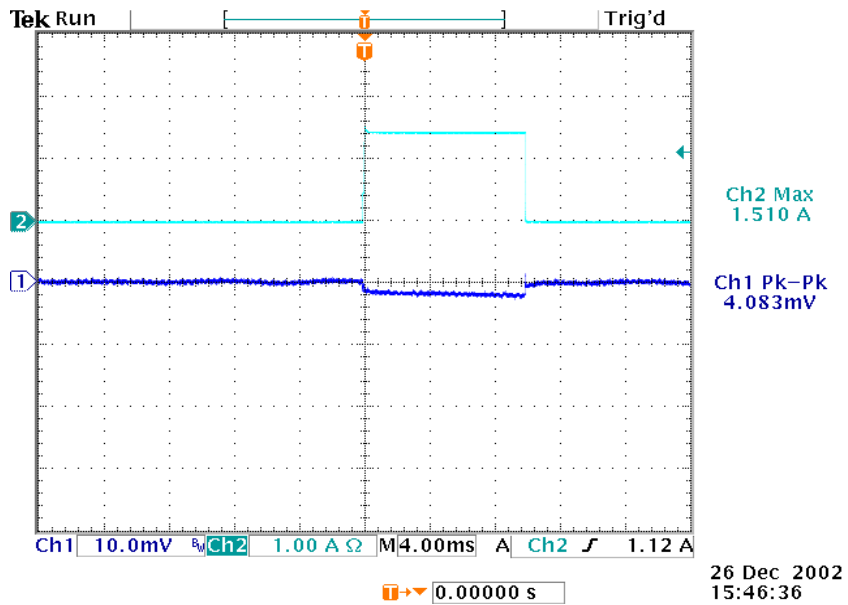
| W83310S-N                                                                                                                                                                                                    |                         |     |     |     |       |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|-----|-----|-------|--------------------------------------|
| <i>A<sub>VIN</sub></i> =3.3V; <i>P<sub>VIN</sub></i> =2.5V is recommended, <i>V<sub>DDQ</sub></i> =2.5V, <i>V<sub>REF</sub></i> =1.25V, <i>C<sub>out</sub></i> =100uF, <i>T<sub>A</sub></i> = 0 °C to +70 °C |                         |     |     |     |       |                                      |
| Parameter                                                                                                                                                                                                    | Symbol                  | Min | Typ | Max | Units | Test Conditions                      |
| Output Offset Voltage                                                                                                                                                                                        | <i>V<sub>OS</sub></i>   | -5  | 0   | +5  | mV    | <i>I<sub>OUT</sub></i> =0A           |
| Load Regulation                                                                                                                                                                                              |                         |     | 0.8 |     | %     | Loading:<br>0A→1.5A                  |
|                                                                                                                                                                                                              |                         |     | 0.8 |     |       | Loading:<br>0A→-1.5A                 |
| Input Voltage Range                                                                                                                                                                                          | <i>V<sub>DDQ</sub></i>  |     | 2.5 |     | V     |                                      |
|                                                                                                                                                                                                              | <i>P<sub>VIN</sub></i>  |     | 2.5 |     |       |                                      |
|                                                                                                                                                                                                              | <i>A<sub>VIN</sub></i>  |     | 3.3 |     |       |                                      |
| Operating Current of <i>A<sub>VIN</sub></i>                                                                                                                                                                  | <i>I<sub>AVIN</sub></i> |     | 0.5 | 1   | mA    | No Load( <i>I<sub>OUT</sub></i> =0A) |

Note: Load regulation is tested with a 10ms pulse current and measuring *V<sub>TT</sub>*.

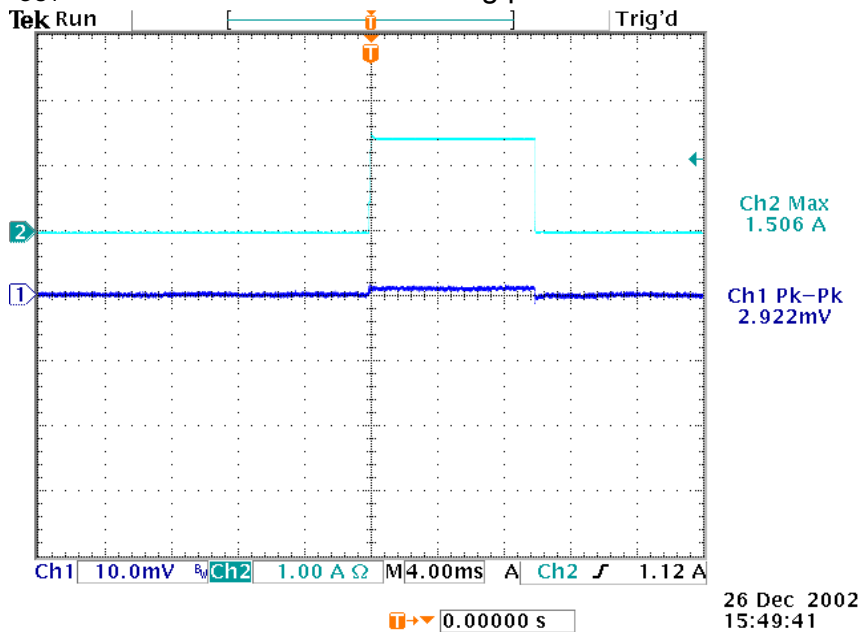


## 8. TYPICAL OPERATING WAVEFORM

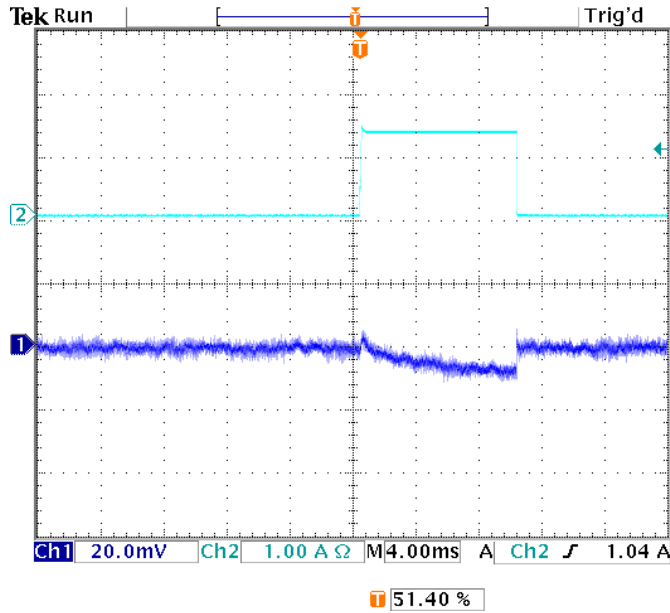
W83310S-R  $V_{OUT}$  offset with a 1.5A/10ms driving pulse current.



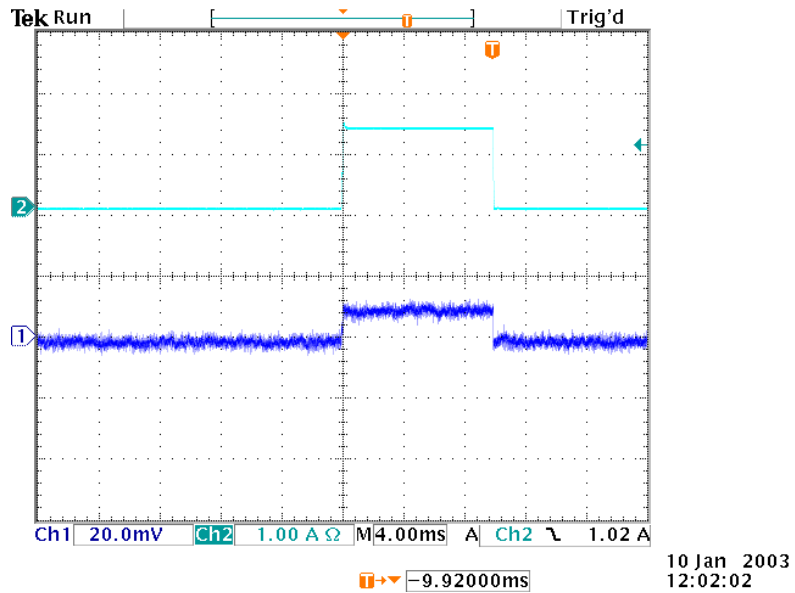
W83310S-R  $V_{OUT}$  offset with a 1.5A/10ms sinking pulse current.



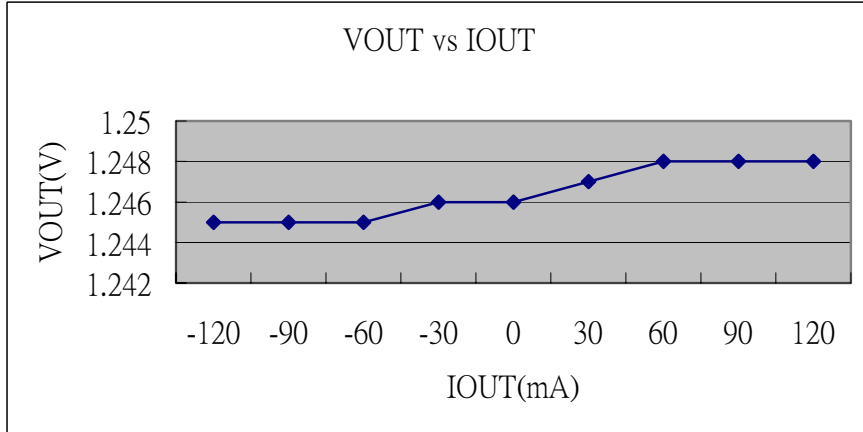
W83310S-N  $V_{TT}$  offset with a 1.5A/10ms driving pulse current.



W83310S-N  $V_{TT}$  offset with a 1.5A/10ms sinking pulse current.



- Load regulation with various sinking/driving loading







## 10. ORDERING INFORMATION

| PART NUMBER | PACKAGE TYPE | PRODUCTION FLOW          |
|-------------|--------------|--------------------------|
| W83310S-R   | 8PIN SOP     | Commercial, 0°C to +70°C |
| W83310S-N   | 8PIN SOP     | Commercial, 0°C to +70°C |

## 11. HOW TO READ THE TOP MARKING



Left line: Winbond logo

1<sup>st</sup> & 2<sup>nd</sup> line: W83310S-R/N – the part number

3rd line: Tracking code Tracking code 249 O A

249: packages assembled in Year 02', week 49

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

B: the IC version



## 12. REVISION HISTORY

| VERSION | DATE      | PAGE | DESCRIPTION                                              |
|---------|-----------|------|----------------------------------------------------------|
| 0.51    | 12/2002   | N.A. | The versions before 0.5 are only for internal reference. |
| 0.60    | 02/2003   | 3    | Recommend circuit update                                 |
| 0.61    | 03/2003   | 5    | AC specification update                                  |
| 1.0     | 4/13/2005 | 12   | Add disclaimer                                           |
|         |           |      |                                                          |
|         |           |      |                                                          |

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