

**Winbond**  
**Bus Termination Regulator**  
**W83310DS/DG**

## **W83310DS** **Datasheet Revision History**

	<b>Pages</b>	<b>Dates</b>	<b>Version</b>	<b>Version on Web</b>	<b>Main Contents</b>
1		May/03	0.5	N.A.	All versions before 0.5 are only for internal use.
2	1	May/03	0.51	N.A.	Typo corrected.
3	5	May/03	0.60	N.A.	Electrical characteristics update.
4	5	Jul./03	0.61	N.A.	Electrical characteristics update.
5	10,11	Feb./04	0.70	N.A.	Package dimension outline and Thermal data.
6	11	Mar./04	0.71	N.A.	Thermal data update.
7	All	Sep./04	0.8	N.A.	Add Pb-free part W83310DG.
8	1	May/05	0.9	N.A.	Add DDR II support spec

Please note that all data and specifications are subject to change without notice. All the trademarks of products and companies mentioned in this datasheet belong to their respective owners.

### **LIFE SUPPORT APPLICATIONS**

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Winbond customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Winbond for any damages resulting from such improper use or sales.

## 1. General Description

The W83310DS/DG is a linear regulator provides a power achieves continuous 2.0Amp bi-directional sinking and driving capability for a high speed bus terminator application. The chip simply implements a stable power supply which tracks half of input power dynamically for bus terminator with a single chip; it's also can be fixed with the input of  $V_{REF1}$  and  $V_{REF2}$  pins following with setting of pin BOOT\_SEL. The W83310DS/DG is promoted with small footprint 8-SOP 150mil power package. With W83310DS/DG design, a high integration, high performance, and cost-effective solution is promoted.

## 2. Features

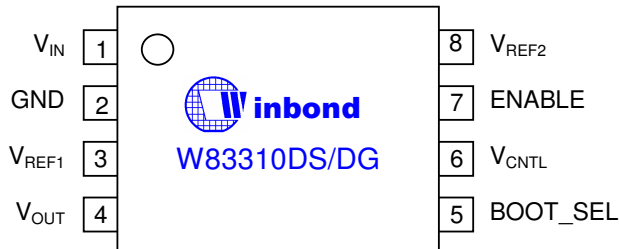
- ❖ Regulates a bi-directional power with driving and sinking capability
- ❖ Provides achieve continuous 2.0Amp driving and sinking current
- ❖ Power MOSFET integrated
- ❖ Low external component count
- ❖ Low output voltage offset
- ❖ VCNTL Operates with +3.3V & 2.5 V power
- ❖ 8-SOP 150mil small power package
- ❖ Low cost and easy to use

## 3. Applications

- ❖ DDR/DDRII Bus Termination Regulator
- ❖ Active Termination Bus
- ❖ Intel® Springdale GMCH- $V_{TT}$  Support
- ❖ SSTL-2
- ❖ SSTL-3

#### 4. Pin Configuration and Description

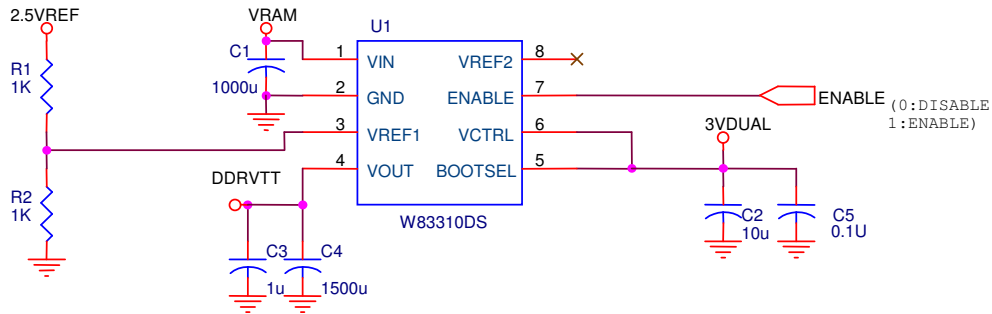
- W83310DS/DG



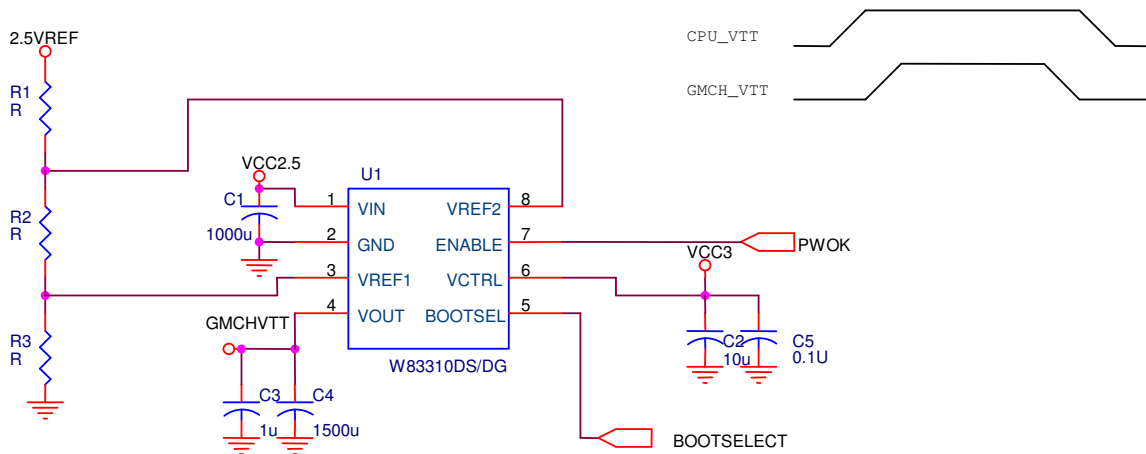
SYMBOL	PIN	FUNCTION
$V_{IN}$	1	Main power input pin.
GND	2	Power ground.
$V_{REF1}$	3	Internal reference voltage source 1. Reference voltage on the pin will be referred with the value of pin <a href="#">BOOT_SEL set high</a> .
$V_{OUT}$	4	Voltage output pin.
BOOT_SEL	5	A signal for the chip reference voltage source selection. The function is designed for Intel® Springdale chipset GMCH_ $V_{TT}$ application.
$V_{CNTL}$	6	Power for internal control logic use
ENABLE	7	Chip function enable pin. 1: Enable; 0: Disable
$V_{REF2}$	8	Internal reference voltage source 2. Reference voltage of the pin will be referred with the value of pin <a href="#">BOOT_SEL set low</a> .

## 5. Application Circuit

### - W83310DS/DG for DDR SDRAM Application



### - W83310DS/DG for Intel® Springdale GMCH\_VTT Application

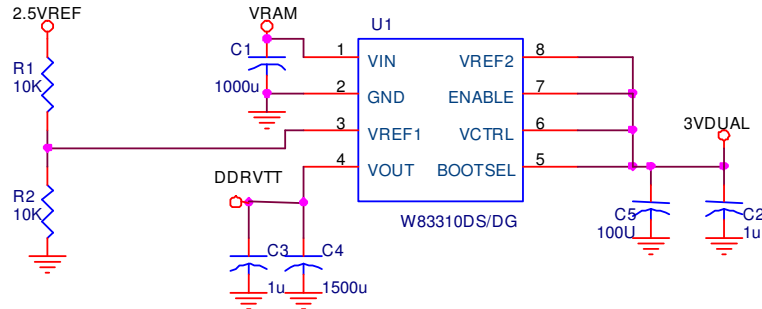


BOOTSELECT=0 GMCHVTT=1.45V for Intel® NORTHWOOD CPU  
 BOOTSELECT=1 GMCHVTT=1.225V for Intel® PRESCOTT CPU

R1: R2: R3 = 4.66: 1.00: 5.44

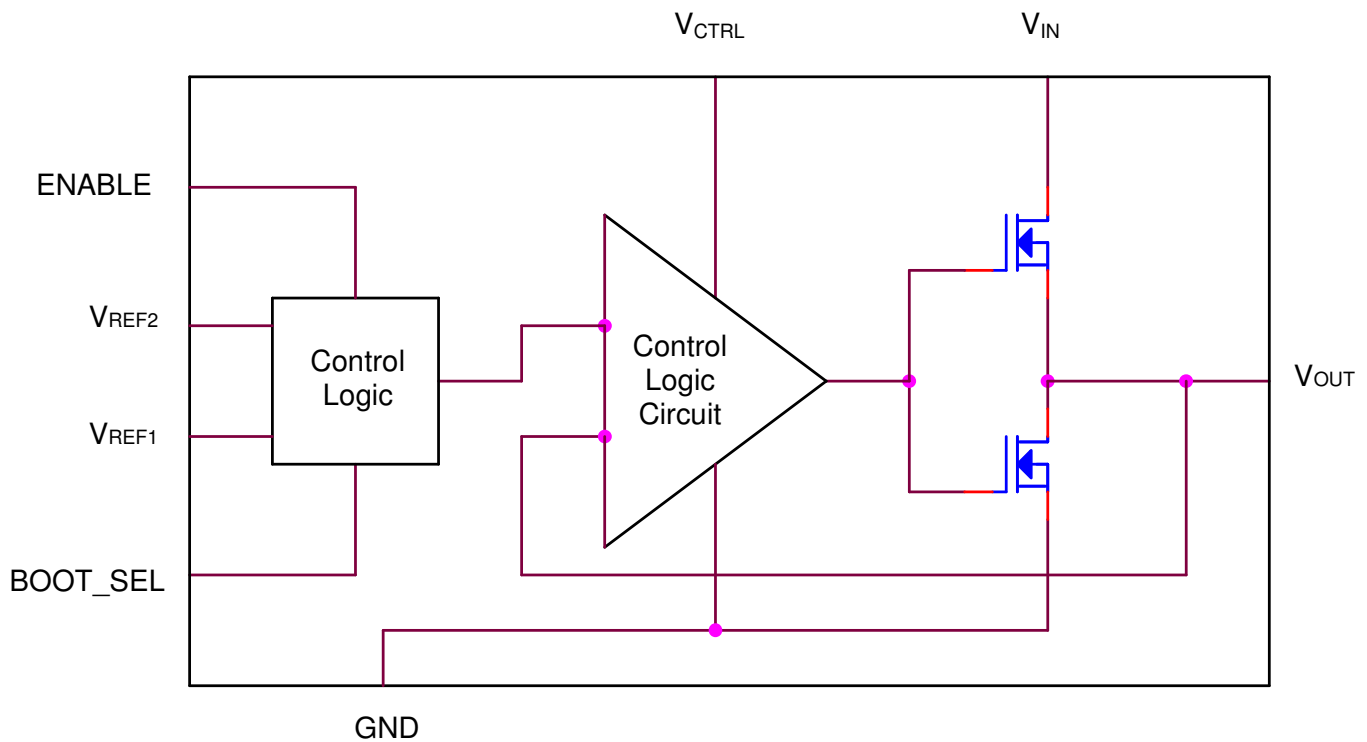
Recommend resistor R1=23.2KΩ, R2=4.99KΩ, R3=27.4KΩ

- Dual Layout of W83310DS/DG and W83310S-R2 for DDR V<sub>TT</sub> Application



W83310S-R2, W83310DS/DG  
DUAL LAYOUT

6. Internal Block Diagram



## 7. Electrical Characteristics

### AC CHARACTERISTICS

<i>C<sub>out</sub>=1000uF, T<sub>A</sub> = 0°C to +70°C</i>						
Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Output Offset Voltage	V <sub>os</sub>	-5	0	+5	mV	I <sub>out</sub> =0A
Load Regulation			0.8		%	Loading: 0A→2.0A
			0.8			Loading: 0A→-2.0A
Input Voltage Range	V <sub>IN</sub>	1.62		3.63	V	
	V <sub>CNTL</sub>		3.3	3.63		
Operating Current of V <sub>CNTL</sub>	I <sub>CNTL</sub>		0.5	1	mA	No Load(I <sub>out</sub> =0A)
Short Current Limit	I <sub>LMT</sub>		4.0		A	

**Note:** Load regulation is tested by using a 1ms current pulse and V<sub>OUT</sub> measuring.

<i>C<sub>out</sub>=1000uF, T<sub>A</sub> = 0°C to +70°C</i>						
Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Output Offset Voltage	V <sub>os</sub>	-5	0	+5	mV	I <sub>out</sub> =0A
Load Regulation			0.8		%	Loading: 0A→2.0A
			0.8			Loading: 0A→-2.0A
Input Voltage Range	V <sub>IN</sub>	1.62		3.63	V	
	V <sub>CNTL</sub>		3.3	3.63		
Operating Current of V <sub>CNTL</sub>	I <sub>CNTL</sub>		0.5	1	mA	No Load(I <sub>out</sub> =0A)
VREF1 Threshold trigger		0.8			V	Output=High
				0.2	V	Output=Low
BOOT_SEL Threshold Trigger		1			V	BOOT_SEL=High
				0.2	V	BOOT_SEL=Low
Short Current Limit	I <sub>LMT</sub>		4.0		A	

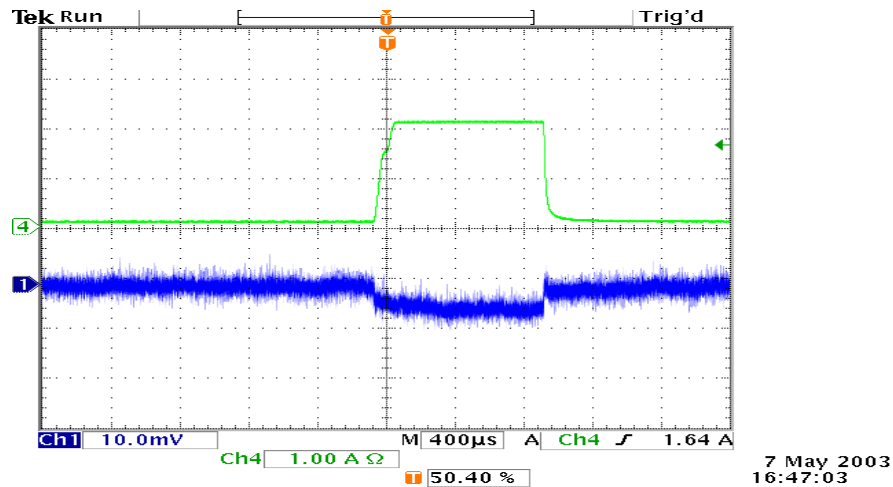
**Note:** Load regulation is tested by using a 1ms current pulse and V<sub>OUT</sub> measuring.

<i>C<sub>out</sub>=1000uF, T<sub>A</sub> = 0°C to +70°C</i>						
Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Output Offset Voltage	V <sub>os</sub>	-5	0	+5	mV	I <sub>out</sub> =0A
Load Regulation			0.8		%	Loading: 0A→2.0A
			0.8			Loading: 0A→-2.0A
Input Voltage Range	V <sub>IN</sub>	1.62		3.63	V	
	V <sub>CNTL</sub>		3.3	3.63		
Operating Current of V <sub>CNTL</sub>	I <sub>CNTL</sub>		0.5	1	mA	No Load(I <sub>out</sub> =0A)
VREF2 Threshold trigger		0.8			V	Output=High
				0.2	V	Output=Low
BOOT_SEL Threshold Trigger		1			V	BOOT_SEL=High
				0.2	V	BOOT_SEL=Low
Short Current Limit	I <sub>LMT</sub>		4.0		A	

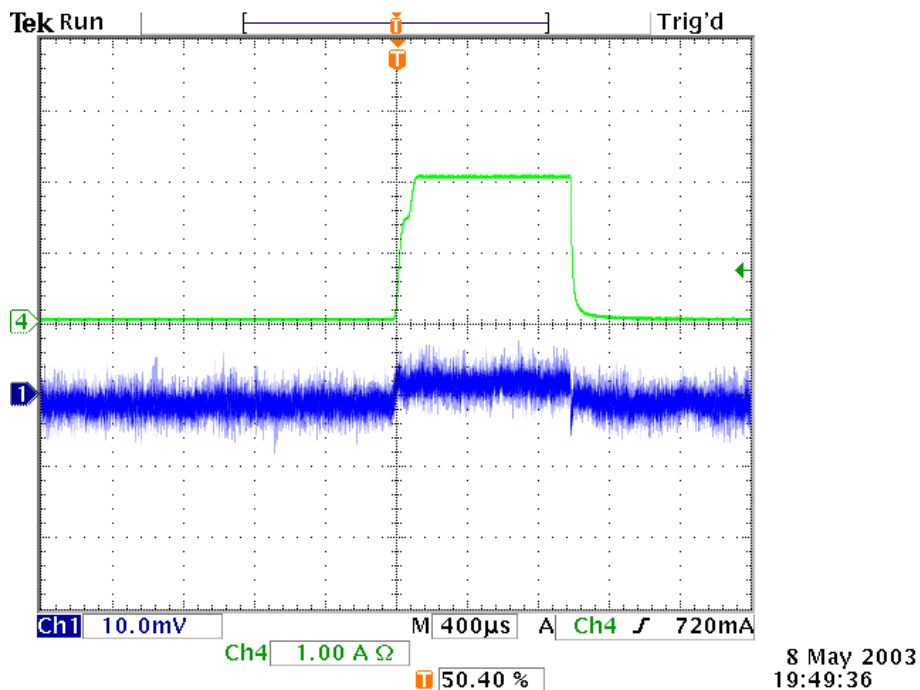
**Note:** Load regulation is tested by using a 1ms current pulse and V<sub>OUT</sub> measuring.

### 8. Typical Operating Waveform

Load regulation with test condition -  $V_{CTRL}=3.3V$ ;  $V_{IN}=2.5V$ ;  $V_{OUT}=1.225V$ ; 2.0Amp pulse driving current.

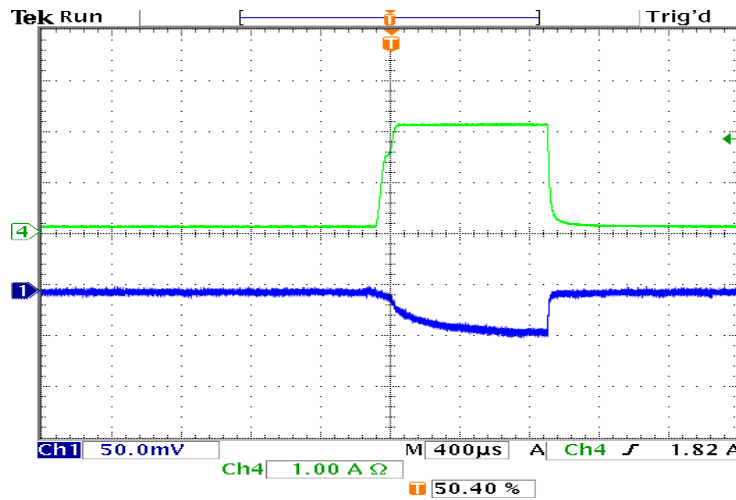


Load regulation with test condition -  $V_{CTRL}=3.3V$ ;  $V_{IN}=2.5V$ ;  $V_{OUT}=1.225V$ ; 2.0Amp pulse sinking current.



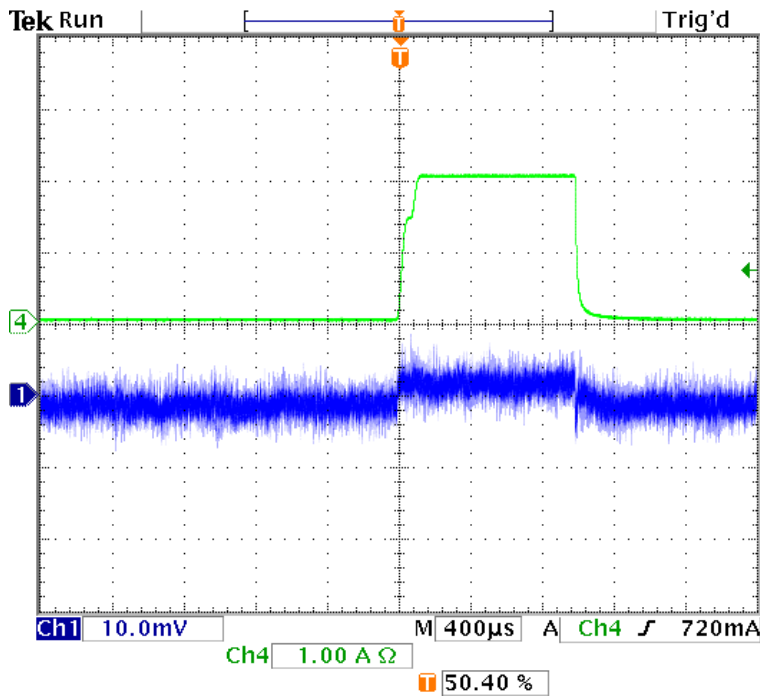


Load regulation with test condition -  $V_{CTRL}=3.3V$ ;  $V_{IN}=2.5V$ ;  $V_{OUT}=1.45V$ ; 2.0Amp pulse driving current.



7 May 2003  
16:45:26

Load regulation with test condition -  $V_{CTRL}=3.3V$ ;  $V_{IN}=2.5V$ ;  $V_{OUT}=1.45V$ ; 2.0Amp pulse sinking current.

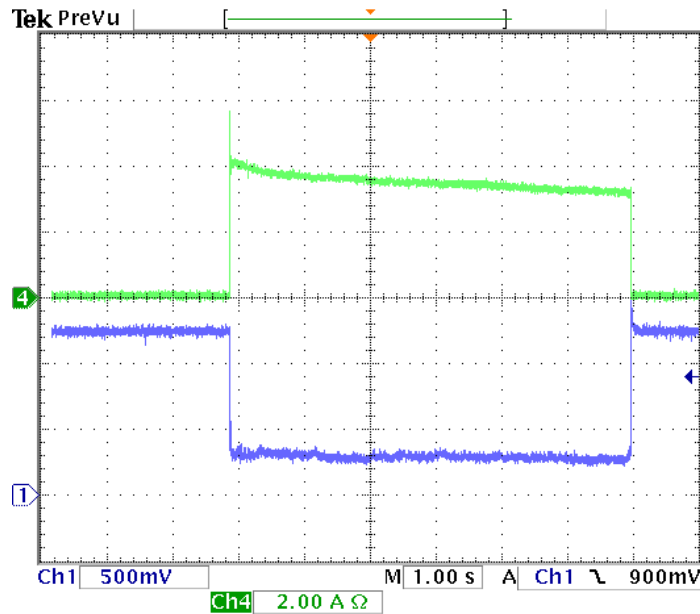


8 May 2003  
19:52:02



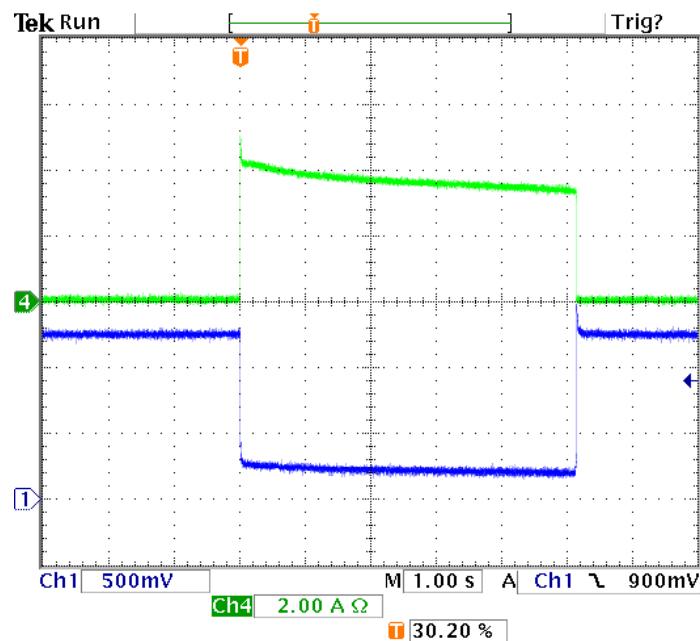
### Short Current Limit

-  $V_{CTRL} = 3.3V$



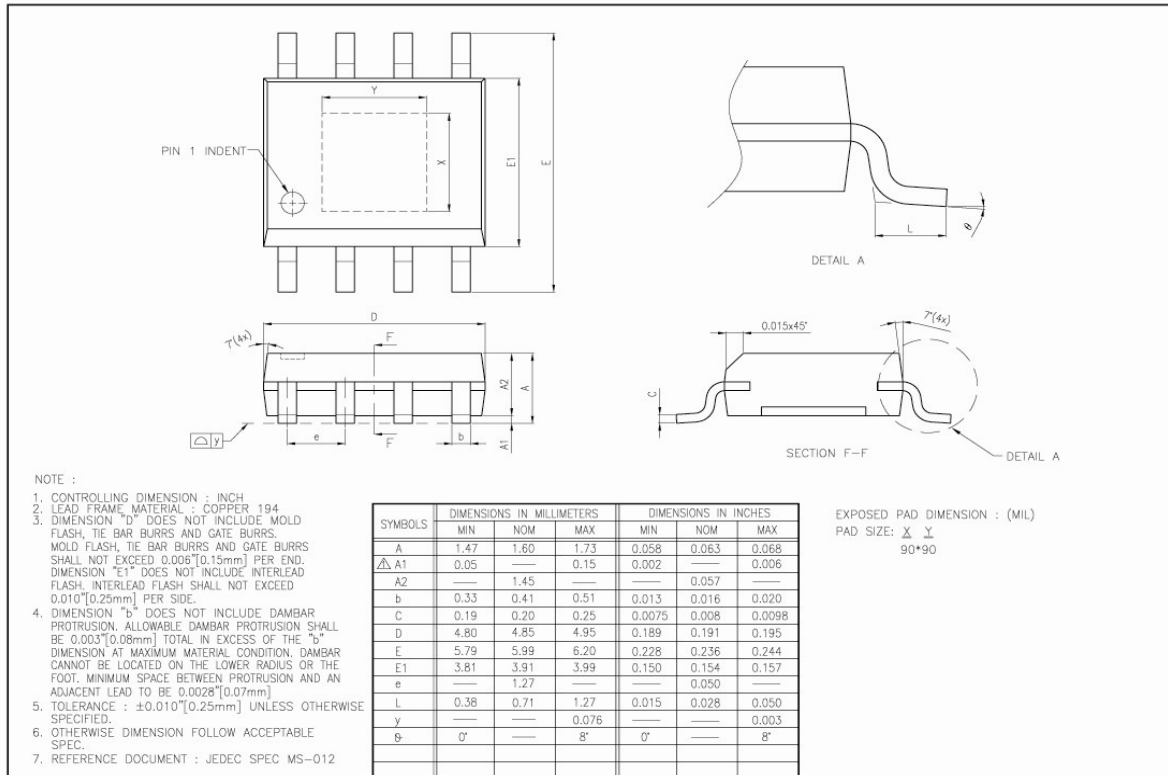
27 May 2003  
19:31:21

-  $V_{CTRL} = 3.6V$



27 May 2003  
19:52:54

**9. Package Dimension**  
**8L Power SOP 150mil**



### 10. Thermal Performance

Test on Four-Layer (2S2P) JEDEC Test Board							
Package	Power (W)	Component Temp. (°C)					Θ jc (°C /W)
		Package	Die	Downset	Lead	Ambient	
PSOP-8	3.05	100	145	79	78	25	14.7

An area of 190mil\*150mil on the top layer is use as a thermal pad for W83310DS and this is connected to the bottom layer by vias. The Θja of the W83310DS mounted on this demo board is about 39 °C /W. Assuming the TA=25 °C and TJ=160 °C, the maximum power dissipation is calculated as: PD(max)=(160-25)/39=3.46W

### 11. Ordering Information

Part Number	Package Type	Production Flow
W83310DS	Power SOP-8	

### 12. How to Read the Top Marking



Left line: Winbond logo  
 1<sup>st</sup> & 2<sup>nd</sup> line: W83310DS/DG – the part number  
 3rd line: Tracking code 318 G A  
**318**: packages assembled in Year 03', week 18  
**G**: assembly house ID; O means OSE, G means GR, etc.  
**A**: the IC version



W83310DS/DG

PRELIMINARY



**Headquarters**

No. 4, Creation Rd. III  
Science-Based Industrial Park  
Hsinchu, Taiwan  
TEL: 886-35-770066  
FAX: 886-35-789467  
www: <http://www.winbond.com.tw/>

**Winbond Electronics (H.K.) Ltd.**

Rm. 803, World Trade Square, Tower II  
123 Hoi Bun Rd., Kwun Tong  
Kowloon, Hong Kong  
TEL: 852-27516023-7  
FAX: 852-27552064

**Winbond Electronics**

**(North America) Corp.**

2727 North First Street  
San Jose, California 95134  
TEL: 1-408-9436666  
FAX: 1-408-9436668

**Taipei Office**

9F, No. 480, Rueiguang Road, Neihu District,  
Taipei, 114, Taiwan  
TEL: 886-2-81777168  
FAX: 886-2-87153579

**Please note that all data and specifications are subject to change without notice. All the trade marks of products and companies mentioned in this data sheet belong to their respective owners. These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Winbond customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Winbond for any damages resulting from such improper use or sale.**