Winbond
Bus Termination Regulator
W83310DS/DG

W83310DS
Datasheet Revision History

	Pages	Dates	Version	Version on Web	Main Contents
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

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

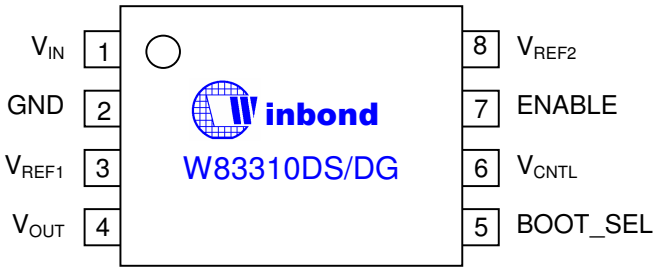
- ❖ Regulates a bi-directional power with driving and sinking capability
- ❖ Provides achieve continuous 2.0Amp driving and sinking current
- ❖ Power MOSFET integrated
- ❖ Low external component count
- ❖ Low output voltage offset
- ❖ VCNTL Operates with +3.3V & 2.5 V power
- ❖ 8-SOP 150mil small power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

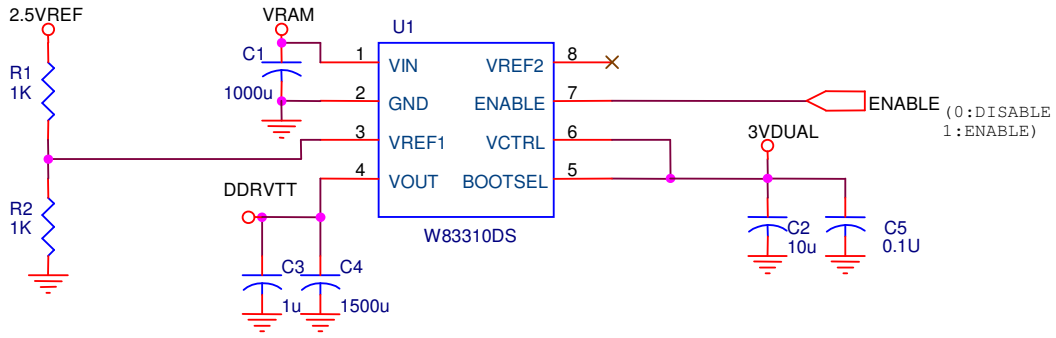
- W83310DS/DG



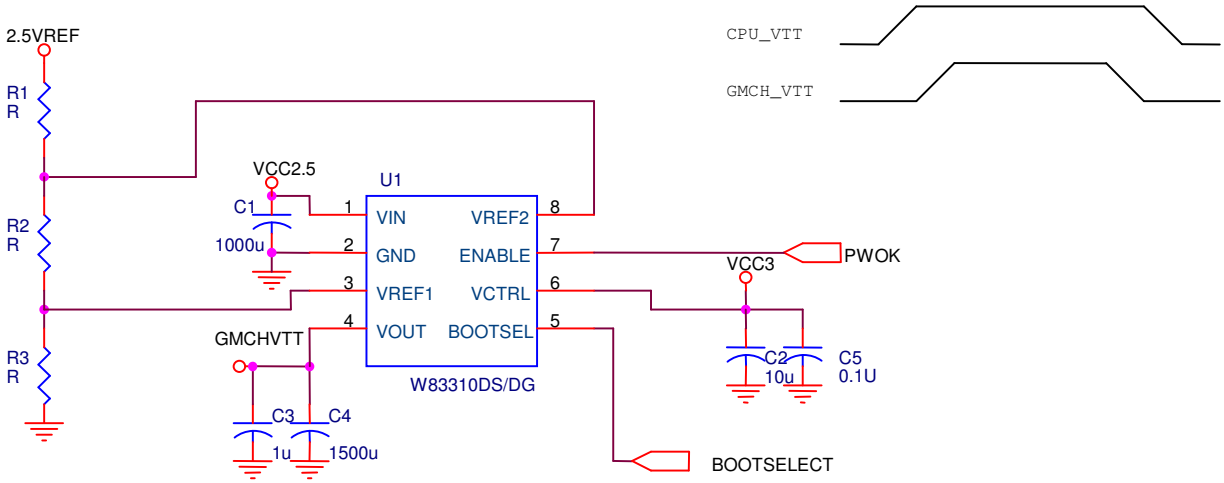
SYMBOL	PIN	FUNCTION
V_{IN}	1	Main power input pin.
GND	2	Power ground.
V_{REF1}	3	Internal reference voltage source 1. Reference voltage on the pin will be referred with the value of pin BOOT_SEL set high.
V_{OUT}	4	Voltage output pin.
BOOT_SEL	5	A signal for the chip reference voltage source selection. 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 BOOT_SEL set low.

5. Application Circuit

- W83310DS/DG for DDR SDRAM Application



- W83310DS/DG for Intel® Springdale GMCH_VTT Application

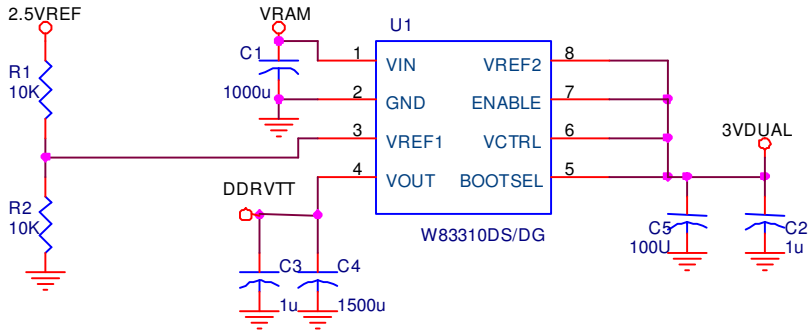


BOOTSELECT=0 GMCHVTT=1.45V for Intel® NORTHWOOD CPU
BOOTSELECT=1 GMCHVTT=1.225V for Intel® PRESCOTT CPU

R1: R2: R3 = 4.66: 1.00: 5.44

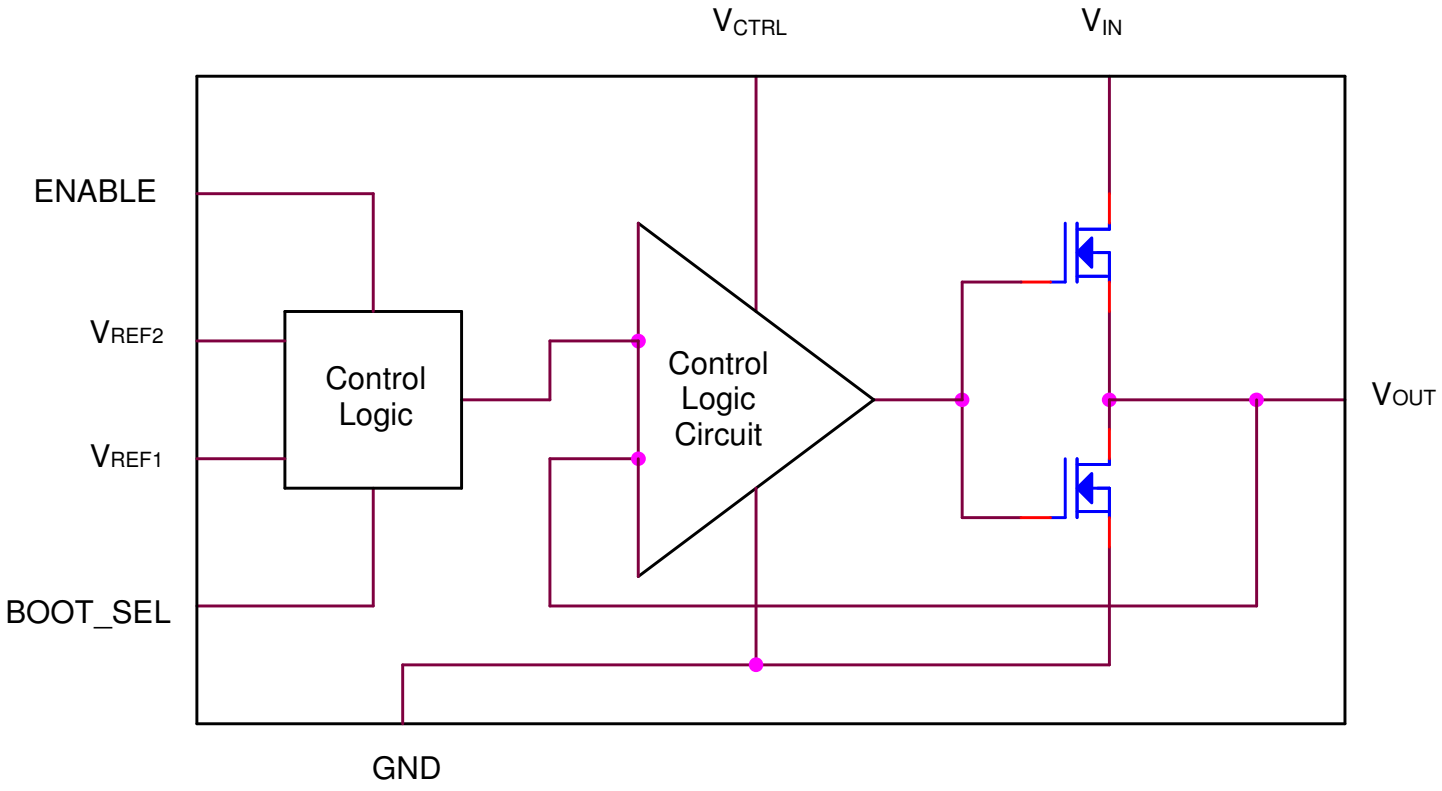
Recommend resistor R1=23.2KΩ, R2=4.99KΩ, R3=27.4KΩ

- Dual Layout of W83310DS/DG and W83310S-R2 for DDR V_{TT} Application



W83310S-R2, W83310DS/DG
DUAL LAYOUT

6. Internal Block Diagram



7. Electrical Characteristics

AC CHARACTERISTICS

Cout=1000uF, T_A = 0°C to +70°C						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Test Conditions**
Output Offset Voltage	**Vos**	-5	0	+5	mV	Iout=0A
Load Regulation			0.8		%	Loading: 0A→2.0A
			0.8			Loading: 0A→-2.0A
Input Voltage Range	**VIN**	1.62		3.63	V	
	VCNTL		3.3	3.63		
Operating Current of VCNTL	**ICNTL**		0.5	1	mA	No Load(Iout=0A)
Short Current Limit	**ILMT**		4.0		A	

Note: Load regulation is tested by using a 1ms current pulse and V_{OUT} measuring.

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Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Test Conditions**
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Input Voltage Range	**VIN**	1.62		3.63	V	
	VCNTL		3.3	3.63		
Operating Current of VCNTL	**ICNTL**		0.5	1	mA	No Load(Iout=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	**ILMT**		4.0		A	

Note: Load regulation is tested by using a 1ms current pulse and V_{OUT} measuring.

Cout=1000uF, T_A = 0°C to +70°C						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Test Conditions**
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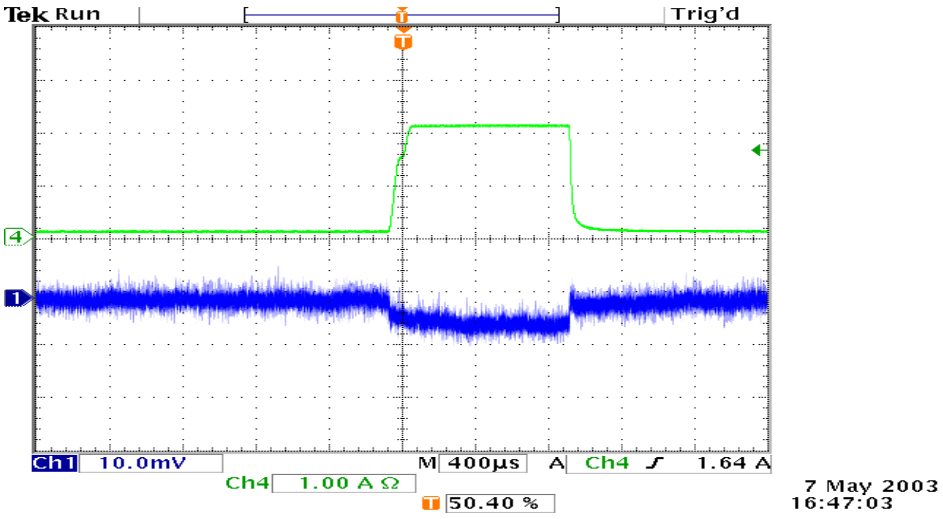
			0.8			Loading: 0A→-2.0A
Input Voltage Range	**VIN**	1.62		3.63	V	
	VCNTL		3.3	3.63		
Operating Current of VCNTL	**ICNTL**		0.5	1	mA	No Load(Iout=0A)
VREF2 Threshold trigger		0.8			V	Output=High
				0.2	V	Output=Low
BOOT_SEL Threshold Trigger		1			V	BOOT_SEL=High
				0.2	V	BOOT_SEL=Low
Short Current Limit	**ILMT**		4.0		A	

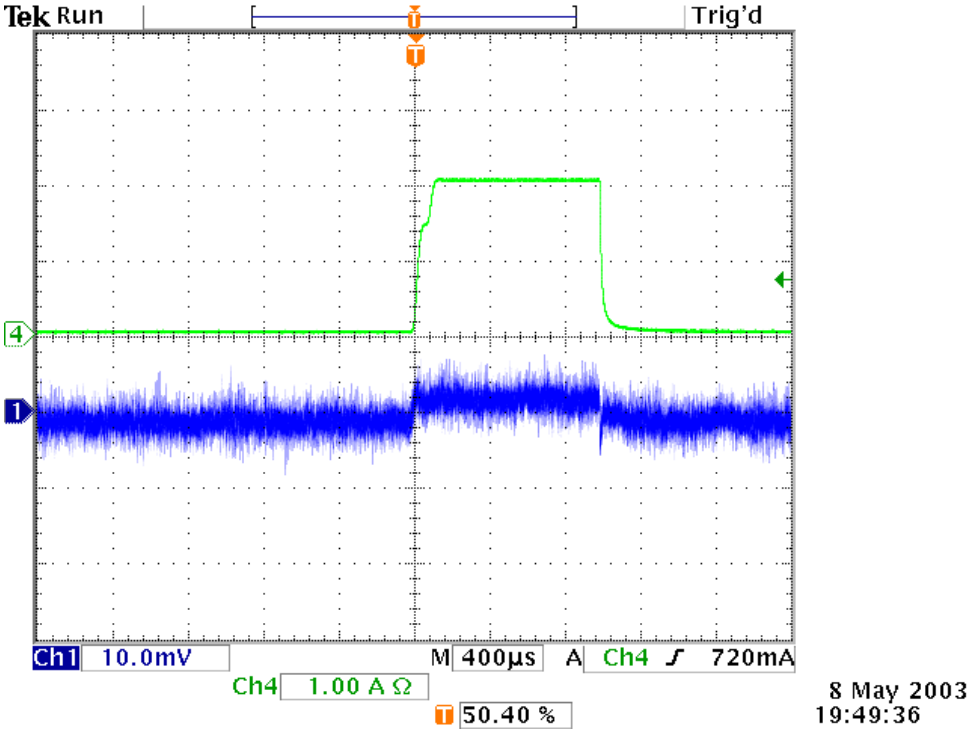
Note: Load regulation is tested by using a 1ms current pulse and V_{OUT} measuring.

8. Typical Operating Waveform

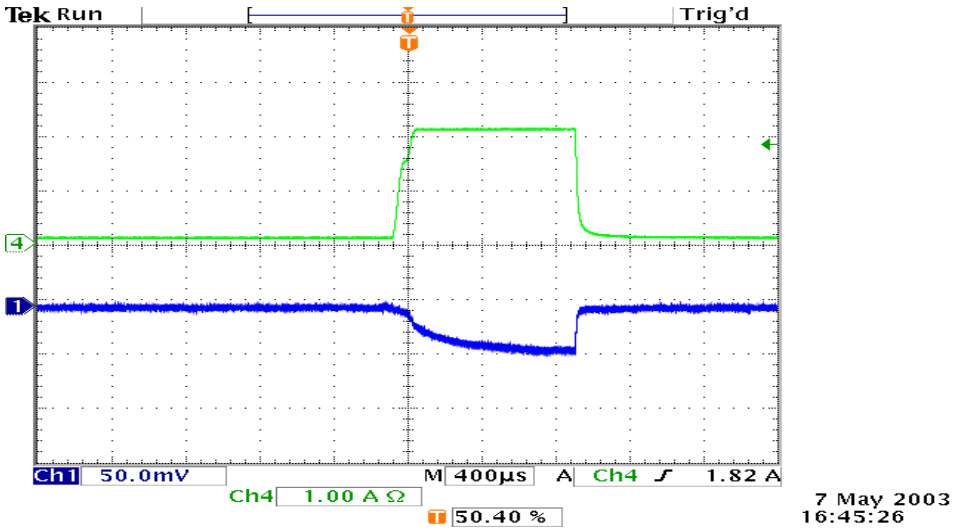
Load regulation with test condition - V_{CTRL}=3.3V; V_{IN}=2.5V; V_{OUT}=1.225V; 2.0Amp pulse driving current.



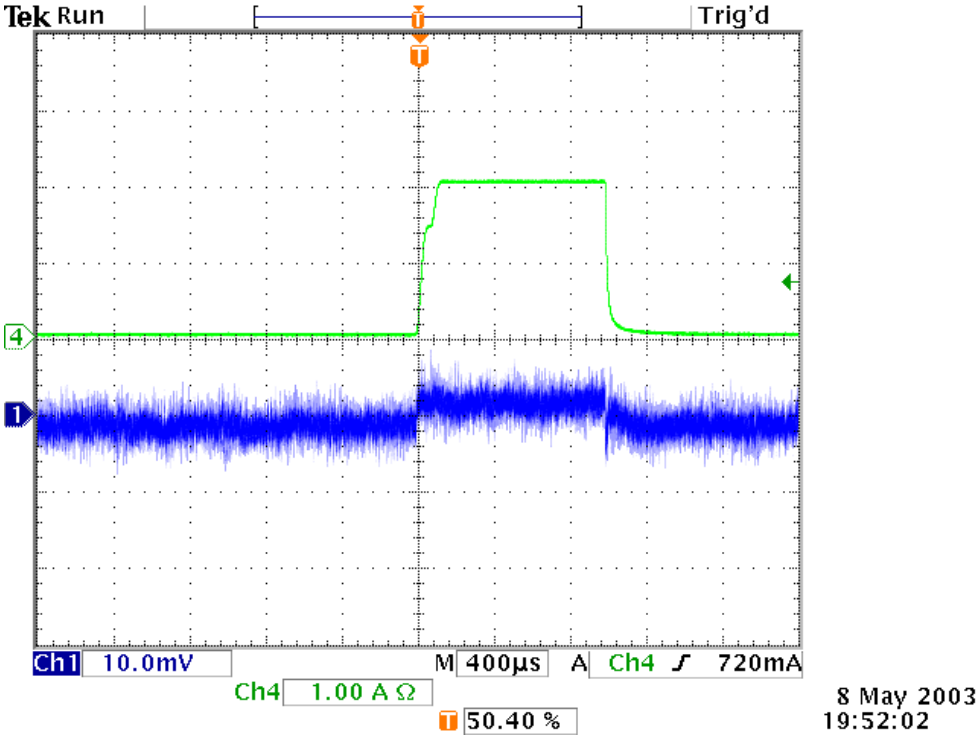
Load regulation with test condition - V_{CTRL}=3.3V; V_{IN}=2.5V; V_{OUT}=1.225V; 2.0Amp pulse sinking current.



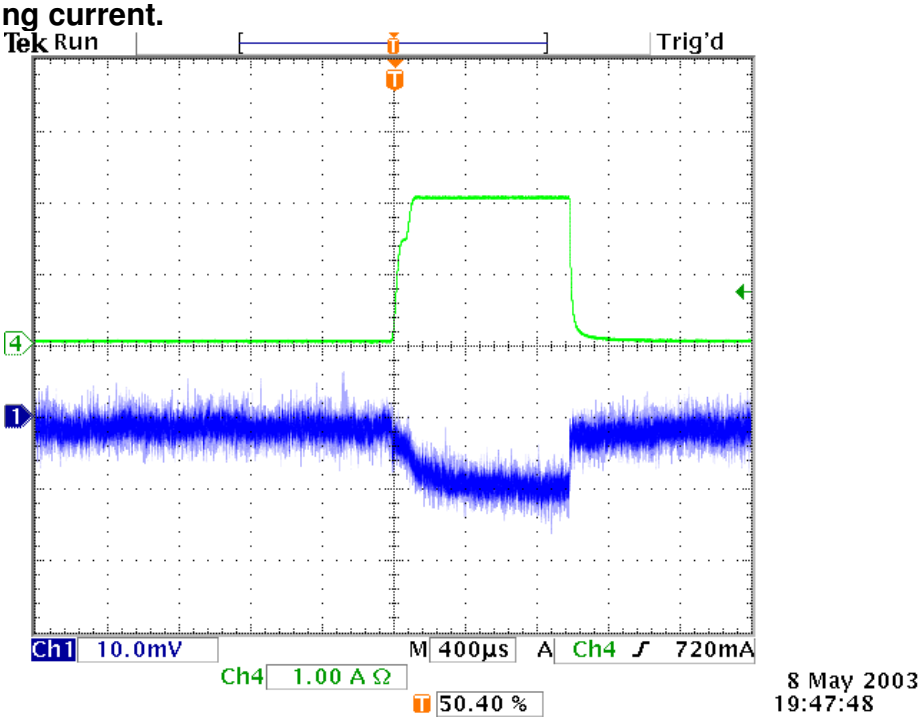
Load regulation with test condition - V_{CTRL}=3.3V; V_{IN}=2.5V; V_{OUT}=1.45V; 2.0Amp pulse driving current.



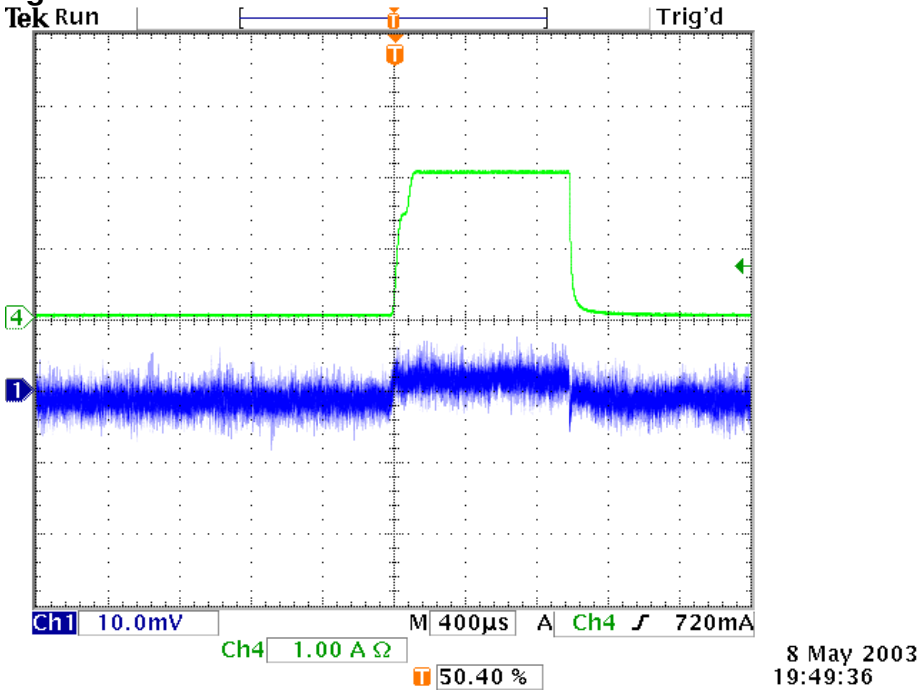
Load regulation with test condition - V_{CTRL}=3.3V; V_{IN}=2.5V; V_{OUT}=1.45V; 2.0Amp pulse sinking current.



Load regulation with test condition - V_{CTRL}=3.3V; V_{IN}=2.5V; V_{OUT}=1.25V; 2.0Amp pulse driving current.

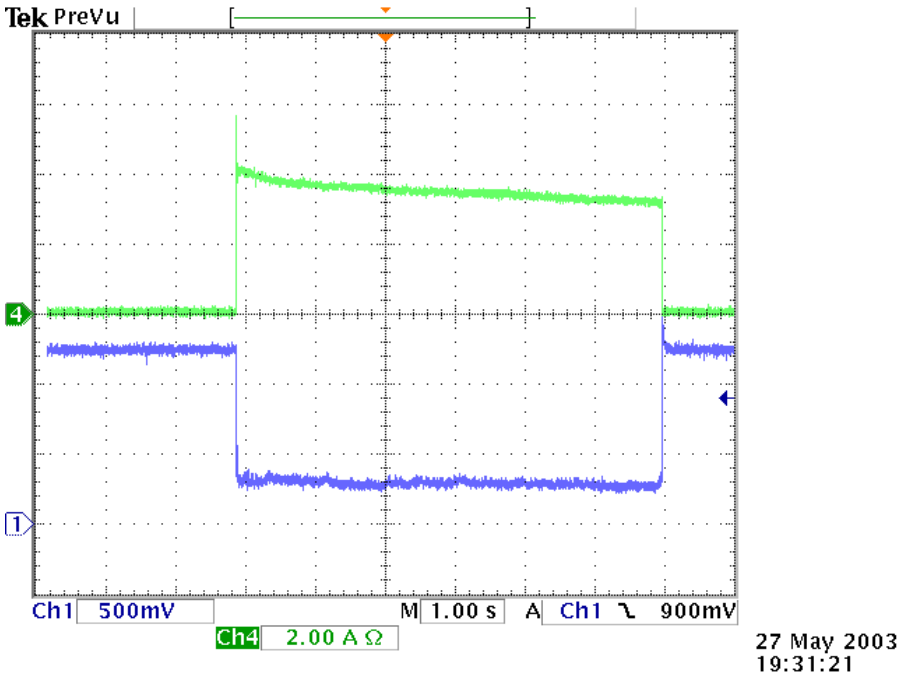


Load regulation with test condition - V_{CTRL}=3.3V; V_{IN}=2.5V; V_{OUT}=1.25V; 2.0Amp pulse sinking current.

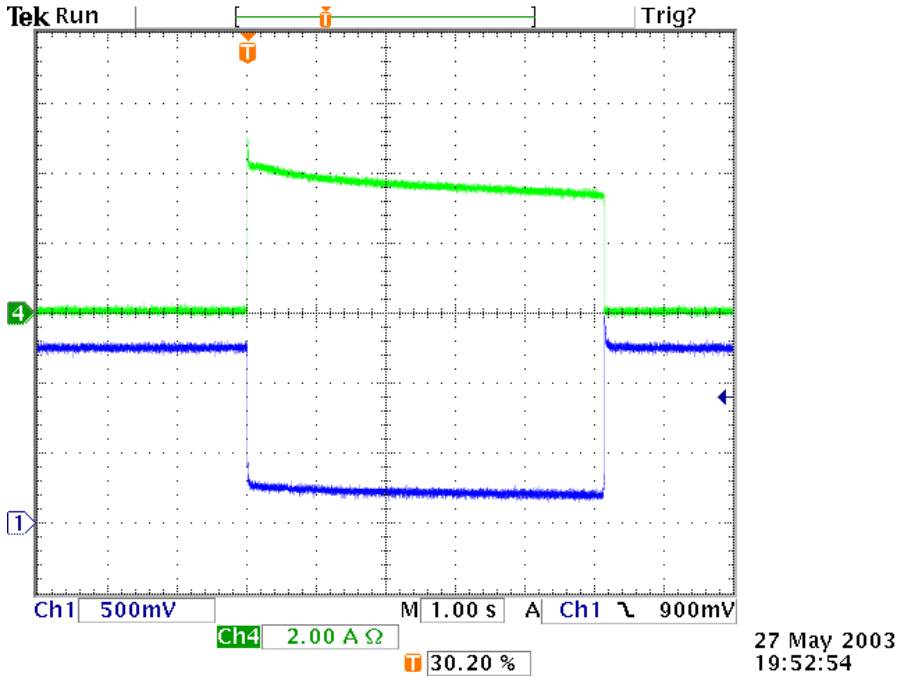


Short Current Limit

- V_{CTRL} = 3.3V

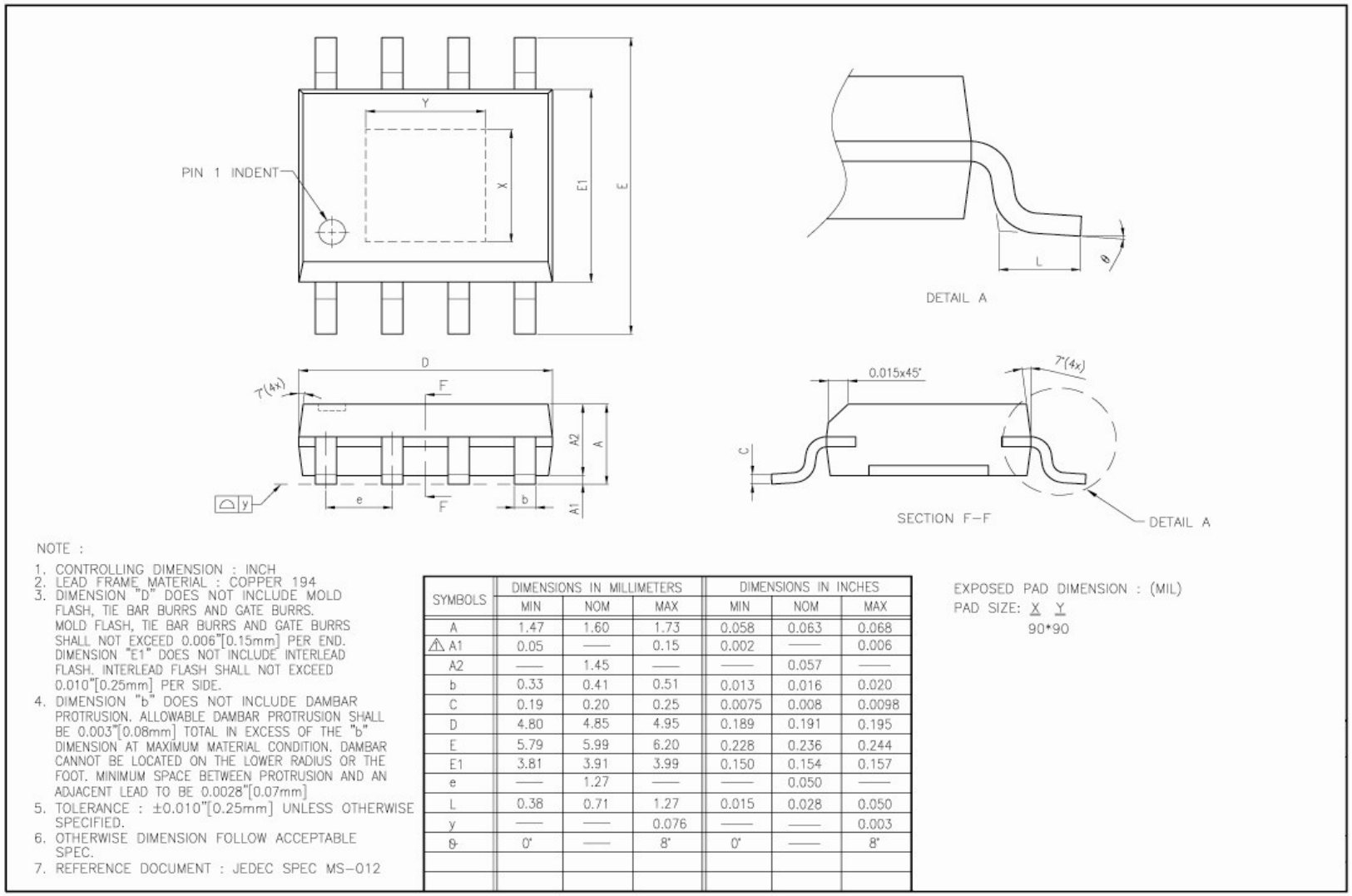


- V_{CTRL} = 3.6V



9. Package Dimension

8L Power SOP 150mil



NOTE :

1. CONTROLLING DIMENSION : INCH
2. LEAD FRAME MATERIAL : COPPER 194
3. DIMENSION "D" DOES NOT INCLUDE MOLD FLASH, TIE BAR BURRS AND GATE BURRS. MOLD FLASH, TIE BAR BURRS AND GATE BURRS SHALL NOT EXCEED 0.006"[0.15mm] PER END. DIMENSION "E1" DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010"[0.25mm] PER SIDE.
4. DIMENSION "b" DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.003"[0.08mm] TOTAL IN EXCESS OF THE "b" DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSION AND AN ADJACENT LEAD TO BE 0.0028"[0.07mm]
5. TOLERANCE : ±0.010"[0.25mm] UNLESS OTHERWISE SPECIFIED.
6. OTHERWISE DIMENSION FOLLOW ACCEPTABLE SPEC.
7. REFERENCE DOCUMENT : JEDEC SPEC MS-012

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.47	1.60	1.73	0.058	0.063	0.068
⚠ A1	0.05	——	0.15	0.002	——	0.006
A2	——	1.45	——	——	0.057	——
b	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.0098
D	4.80	4.85	4.95	0.189	0.191	0.195
E	5.79	5.99	6.20	0.228	0.236	0.244
E1	3.81	3.91	3.99	0.150	0.154	0.157
e	——	1.27	——	——	0.050	——
L	0.38	0.71	1.27	0.015	0.028	0.050
y	——	——	0.076	——	——	0.003
θ	0°	——	8°	0°	——	8°

EXPOSED PAD DIMENSION : (MIL)
PAD SIZE: X Y
90*90

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 T_A=25 °C and T_J=160 °C,the maximum power dissipation is calculated as: $P_{D(max)}$=(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
1st & 2nd 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

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