

W83310S/W83310SG



**Winbond
Bus Termination Regulator
With
Over Temp. & Current Limit
Protection
W83310S
W83310SG**



W83310S Datasheet Revision History

| | PAGES | DATES | VERSION | VERSION ON WEB | MAIN CONTENTS |
|----|--------|---------|---------|----------------|----------------------------------------------------------------------------------|
| 1. | | Oct./03 | 0.5 | N.A. | All versions before 0.5 are for internal use only. |
| 2. | 3,9 | Oct./03 | 0.51 | N.A. | AC spec. and typical waveform update. |
| 3 | 12 | Feb./04 | 0.60 | N.A. | Add the thermal data. |
| 4 | 3 | Jul./04 | 0.61 | N.A. | Add min./typ. value of VIN. |
| 5 | 2,3,11 | Jan./06 | 0.7 | N.A. | Modify application circuit, AC characteristic and add Pb-free part no: W83310SG. |
| | | | | | |

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LIFE SUPPORT APPLICATIONS

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1. GENERAL DESCRIPTION

The W83310S is a linear regulator which provides achieves continuous 1.8 Amp 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 is promoted with SOP-8 power package. With W83310S design, a high integration, high performance, and cost-effective solution is promoted.

2. FEATURES

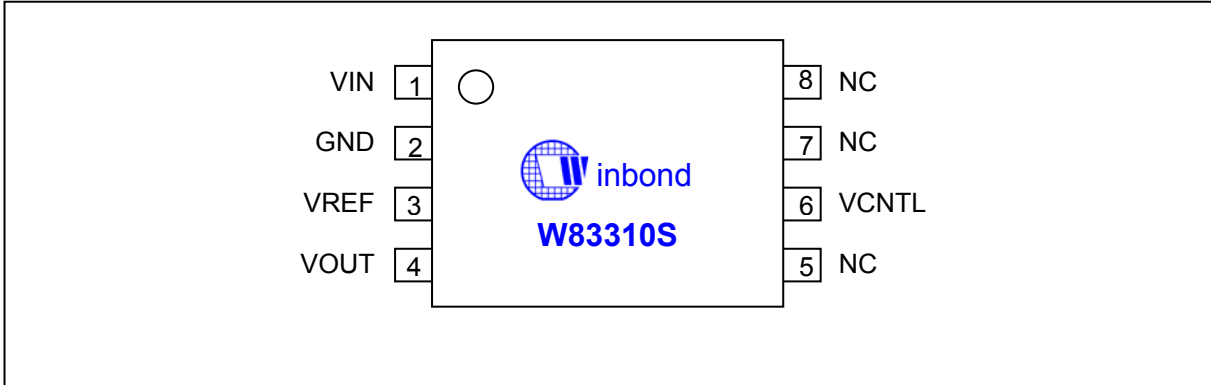
- Regulates a bi-directional power with driving and sinking capability
- Provides achieve continuous 1.8Amp driving and sinking current
- Power MOSFET integrated
- Low external component count
- Low output voltage offset
- Operates with +3.3V and +2.5V control power
- Current limit protection
- Over temperature protection
- Power package SOP-8
- Low cost and easy to use

3. APPLICATIONS

- DDR and DDR II Bus Termination Regulator
- Active Termination Bus
- SSTL-2
- SSTL-3

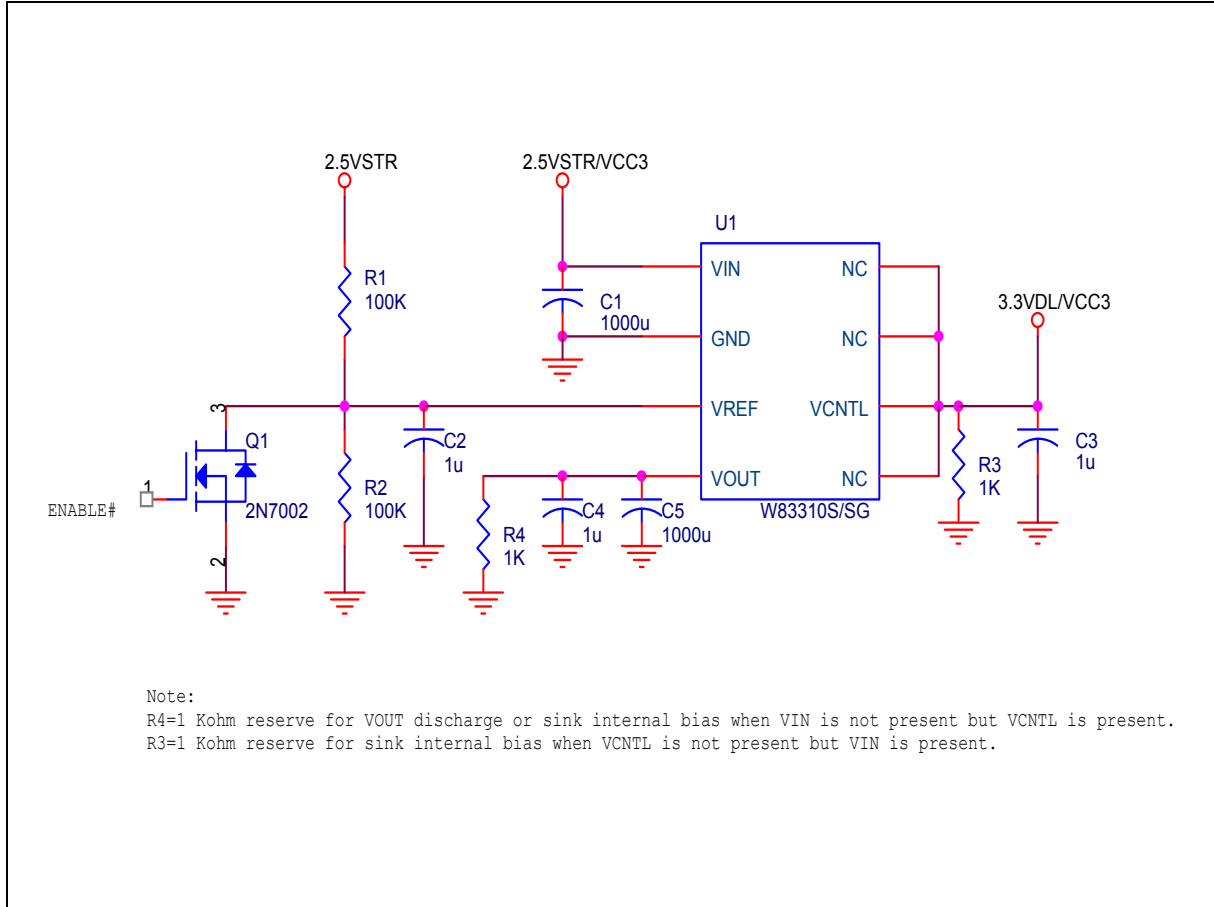


4. PIN CONFIGURATION AND DESCRIPTION



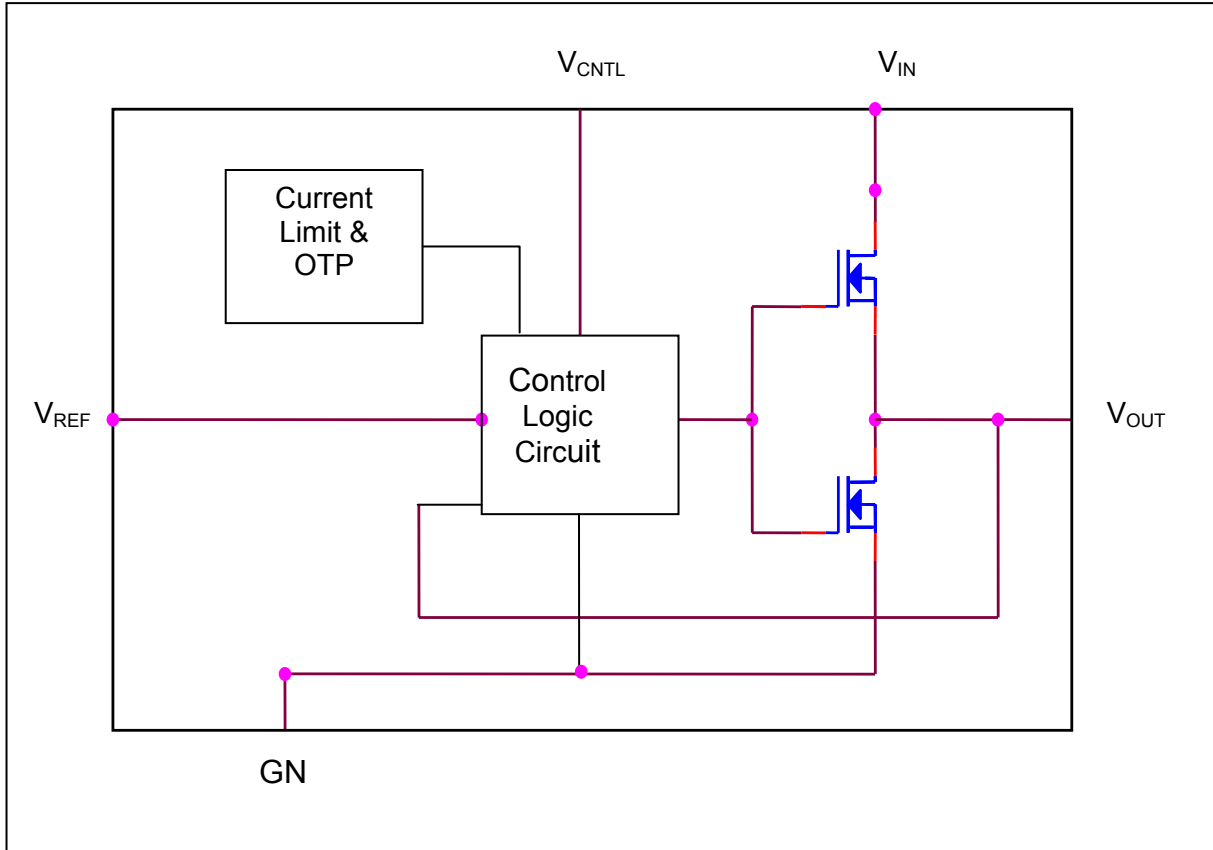
| SYMBOL | PIN | FUNCTION |
|--------|-----|------------------------------------|
| VIN | 1 | Power input pin. |
| GND | 2 | Ground. |
| VREF | 3 | Reference voltage and Chip enable. |
| VOUT | 4 | Output voltage. |
| NC | 5 | No function |
| VCNTL | 6 | Gate drive voltage. |
| NC | 7 | No function |
| NC | 8 | No function |

5. APPLICATION CIRCUIT





6. INTERNAL BLOCK DIAGRAM- W83310S





7. ELECTRICAL CHARACTERISTICS

7.1 AC CHARACTERISTICS

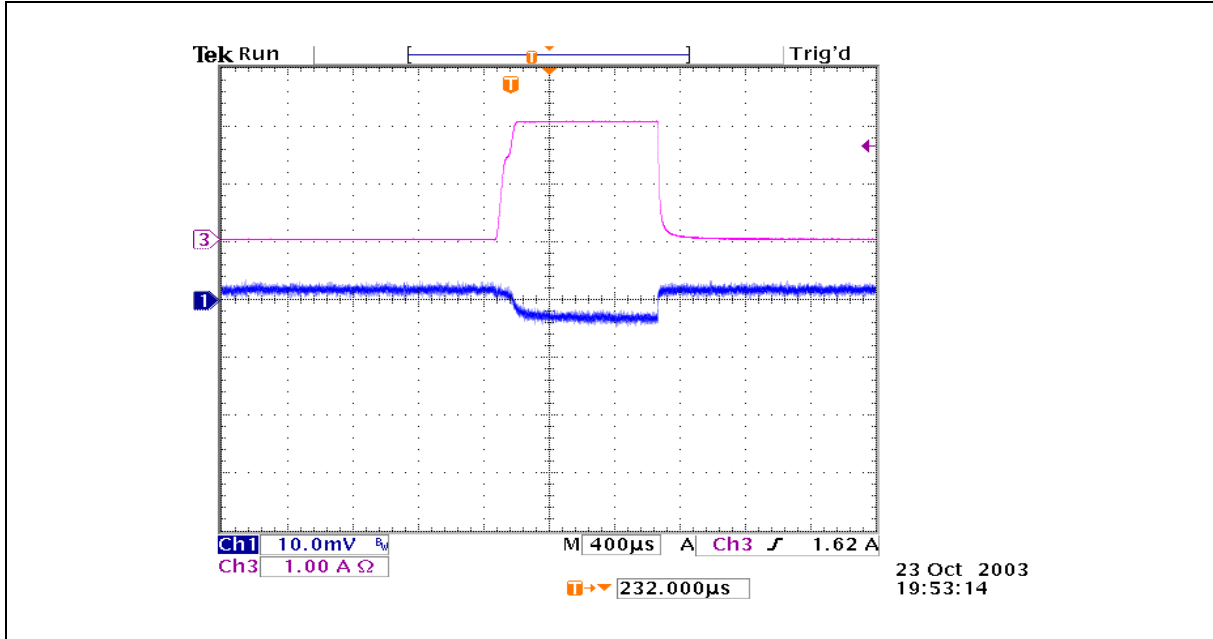
| W83310S | | | | | | |
|---------------------------------------------------------------------------------------------------------------------------------|--------------------|-----|---------|------|-------|-----------------------------------------|
| <i>V_{IN}=2.5V, V_{CNTL}=3.3V, V_{REF}=1.25V, C_{OUT}=100UF, T_A = 0 °C TO +70 °C</i> | | | | | | |
| PARAMETER | SYMBOL | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
| Output Offset Voltage | V _{OS} | -20 | | 20 | mV | I _{OUT} =0A |
| Load Regulation | | -20 | | 20 | mV | Loading: 0A→2.0A |
| | | -20 | | 20 | | Loading: 0A→-2.0A |
| Input Voltage Range | V _{IN} | 1.7 | 2.5/1.8 | 3.63 | V | |
| | V _{CNTL} | | 3.3 | 3.63 | | |
| Operating Current of VCNTL | I _{VCNTL} | | 1 | 1.5 | mA | No Load(I _{OUT} =0A) |
| Operating Current of VIN | I _{VIN} | | | 1 | mA | No Load(I _{OUT} =0A) |
| Shutdown Threshold Trigger | | 0.8 | | | V | Output=High |
| | | | | 0.2 | V | Output=Low |
| Shutdown Current of VIN | I _{SHDN} | | 50 | | uA | V _{REF} <0.2V Loading=50 mA |
| Short Current Limit | I _{LMT} | 4 | | | A | Output short to GND |
| Over Temperature Protection | OTP | 130 | 145 | | °C | |

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

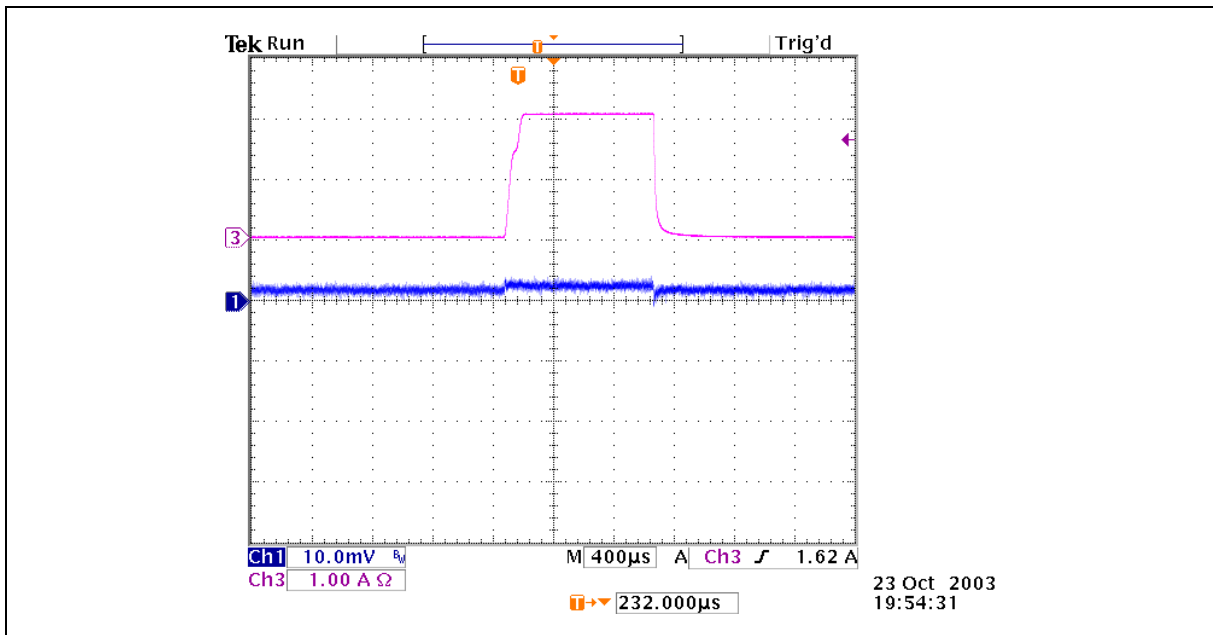


8. TYPICAL OPERATING WAVEFORM

-- Load regulation with test condition - $V_{CTRL}=3.3V$; $V_{IN}=2.5V$; $V_{OUT}=1.25V$; 2.0Amp 1ms duty pulse driving current. $\Delta V \approx 6mV$.



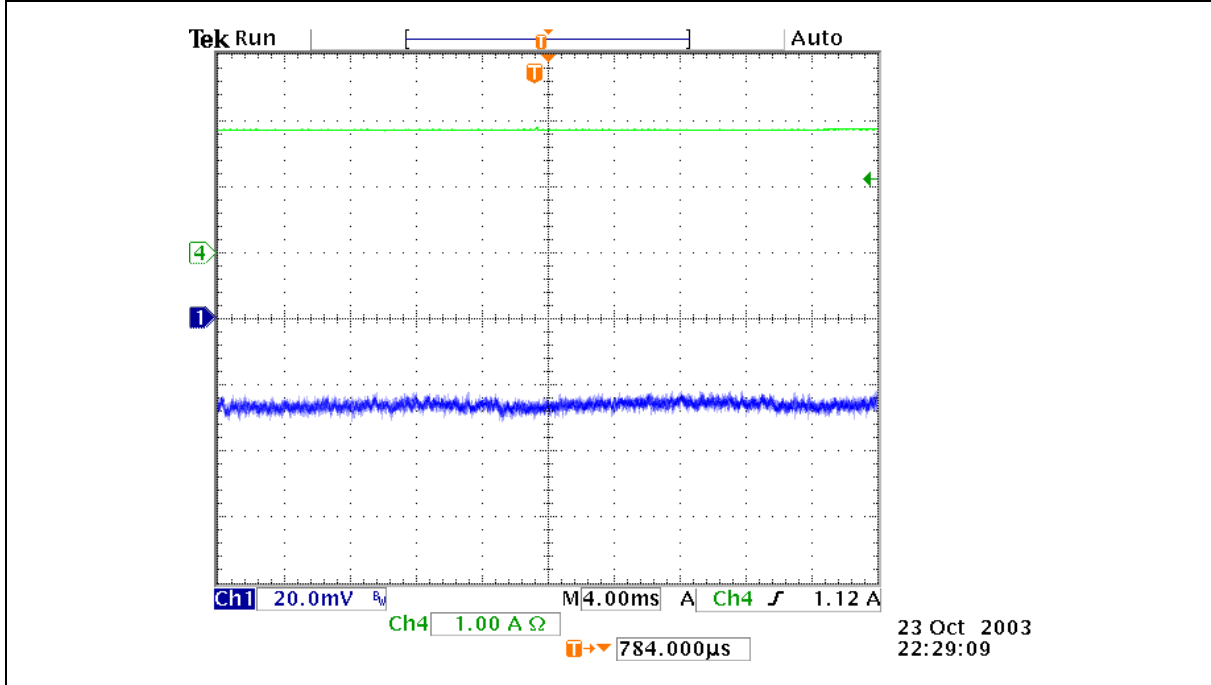
-- Load regulation with test condition - $V_{CTRL}=3.3V$; $V_{IN}=2.5V$; $V_{OUT}=1.25V$; 2.0Amp 1ms duty pulse sinking current. $\Delta V \approx 2mV$.



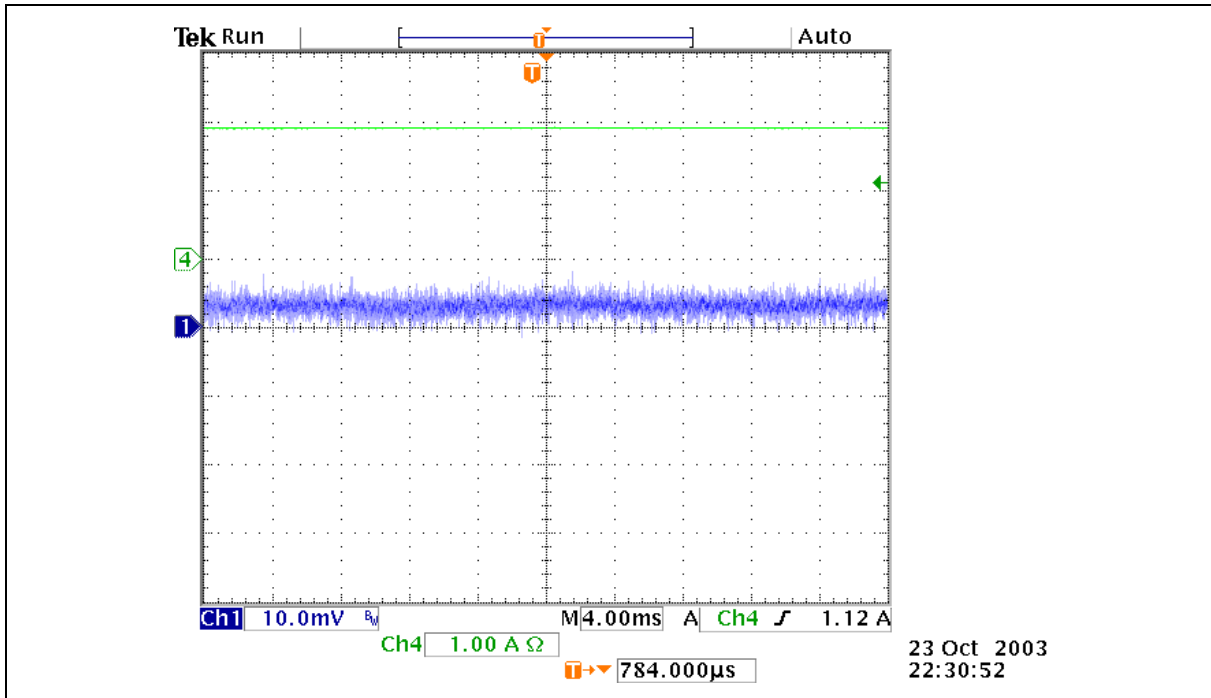
W83310S/W83310SG



-- Load regulation with test condition - $V_{CTRL}=3.3V$; $V_{IN}=2.5V$; $V_{OUT}=1.25V$; 1.8Amp cont. driving current. $\Delta V \approx 24mV$.



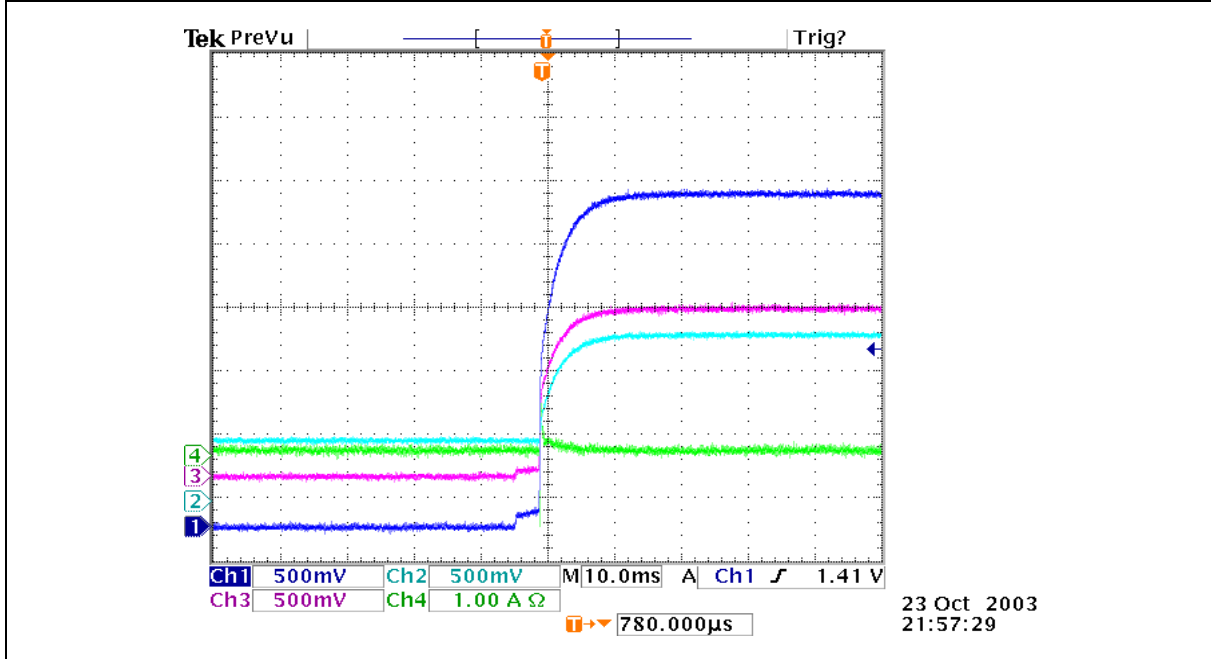
-- Load regulation with test condition - $V_{CTRL}=3.3V$; $V_{IN}=2.5V$; $V_{OUT}=1.25V$; 1.8Amp cont. sinking current. $\Delta V \approx 5mV$



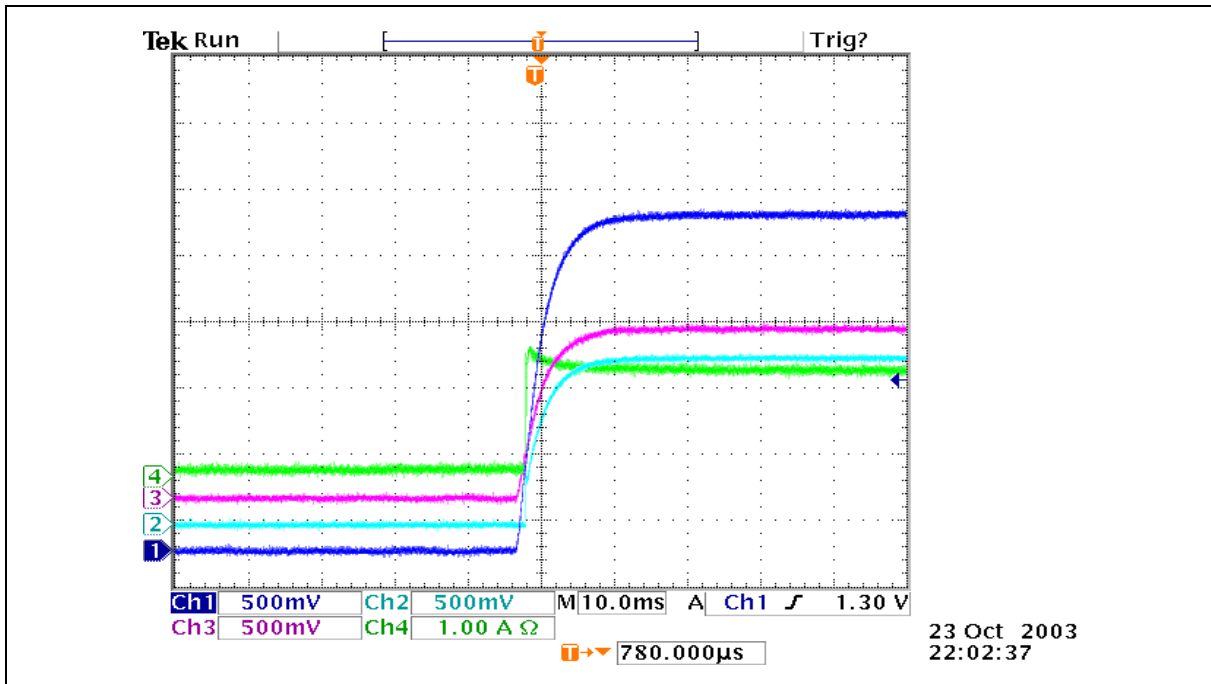
W83310S/W83310SG



-- Power on waveform with condition: DC loading 0A; V_{IN} Cap.: 1000uF; V_{OUT} Cap.: 1000uF. CH1: V_{IN} ; CH2: V_{OUT} ; CH3: V_{REF} ; CH4: Output current



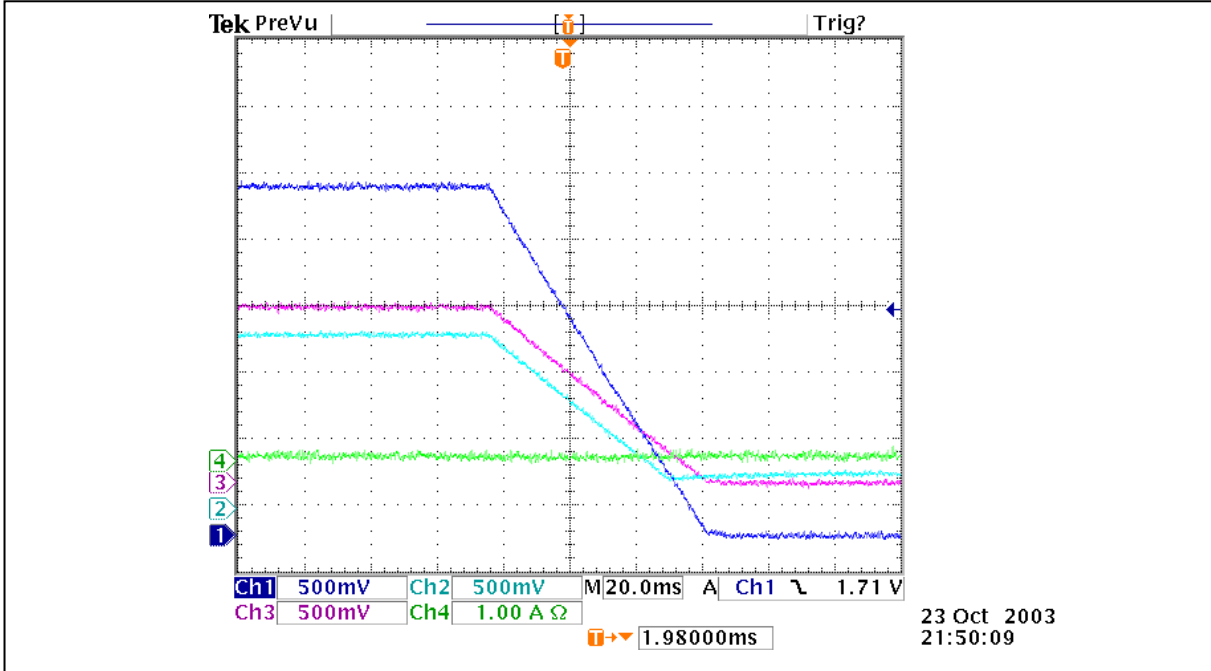
-- Power on waveform with condition: DC loading 1.5Amp; V_{IN} Cap.: 1000uF; V_{OUT} Cap.: 1000uF. CH1: V_{IN} ; CH2: V_{OUT} ; CH3: V_{REF} ; CH4: Output current



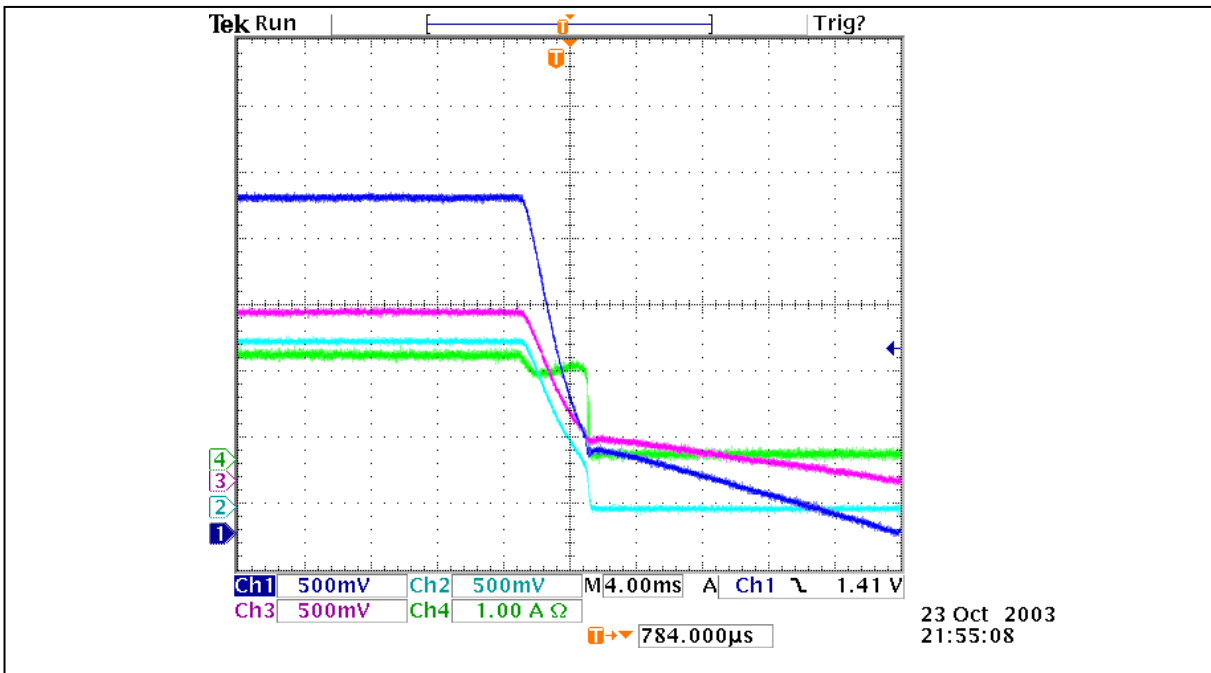
W83310S/W83310SG



-- Power off waveform with condition: DC loading 0A; V_{IN} Cap.: 1000uF; V_{OUT} Cap.: 1000uF. CH1: V_{IN} ; CH2: V_{OUT} ; CH3: V_{REF} ; CH4: Output current

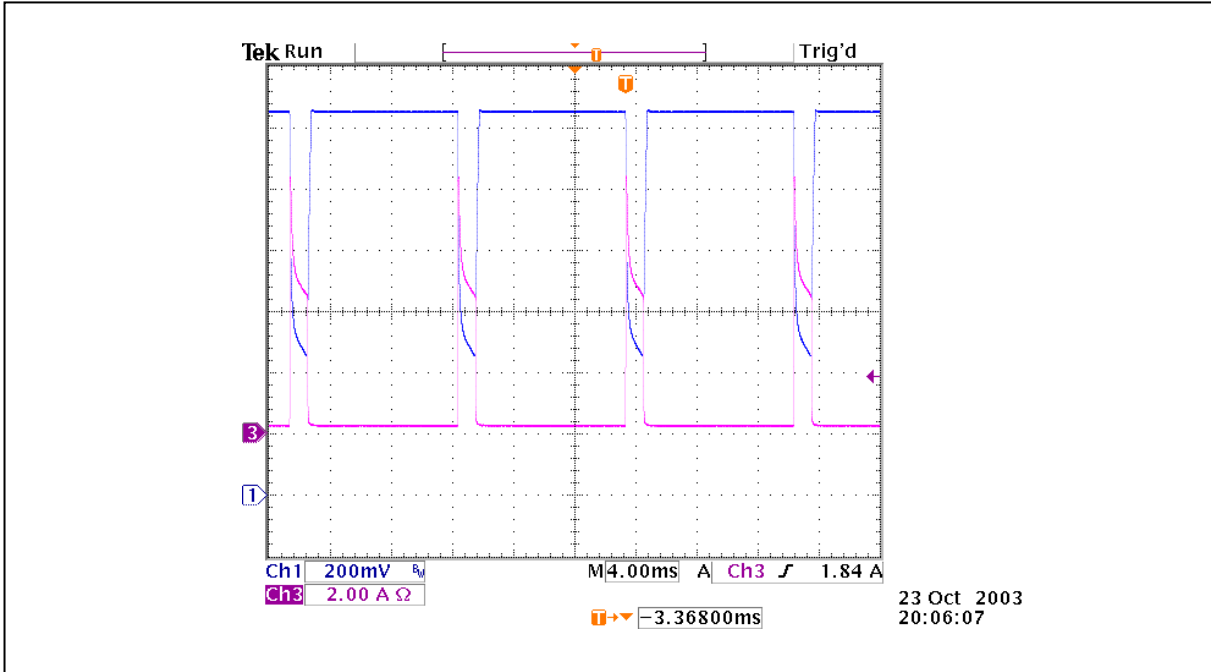


-- Power off waveform with condition: DC loading 1.5A; V_{IN} Cap.: 1000uF; V_{OUT} Cap.: 1000uF. CH1: V_{IN} ; CH2: V_{OUT} ; CH3: V_{REF} ; CH4: Output current

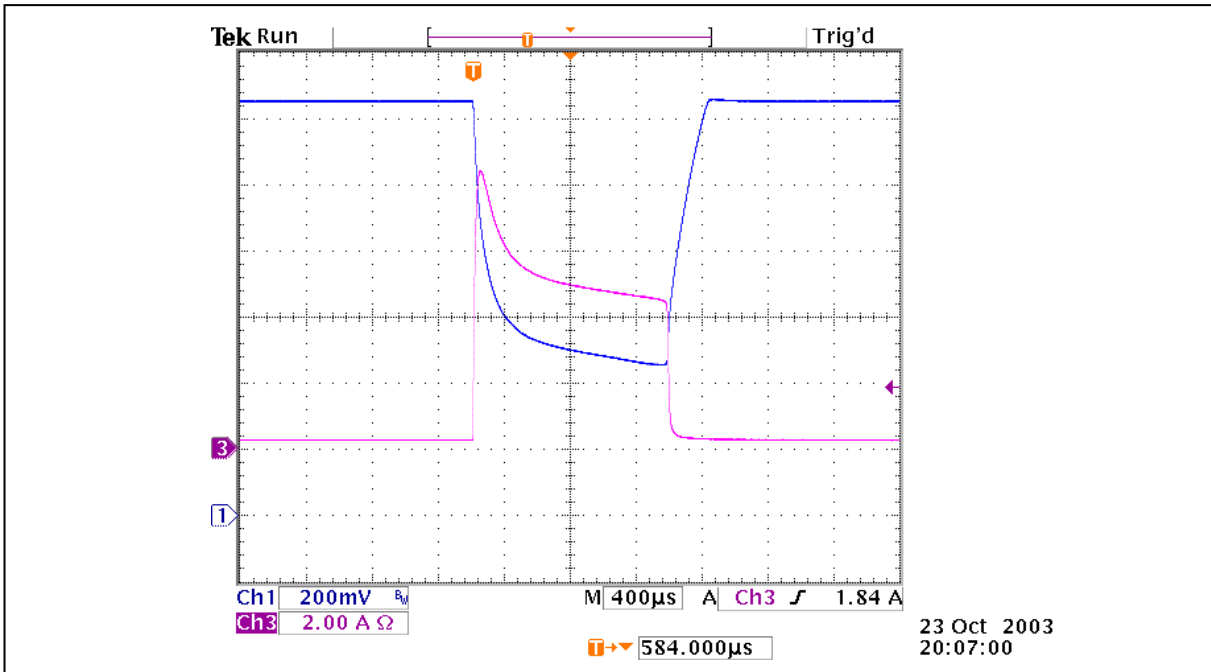




-- Current limit protection: CH1: V_{OUT} CH3: output current

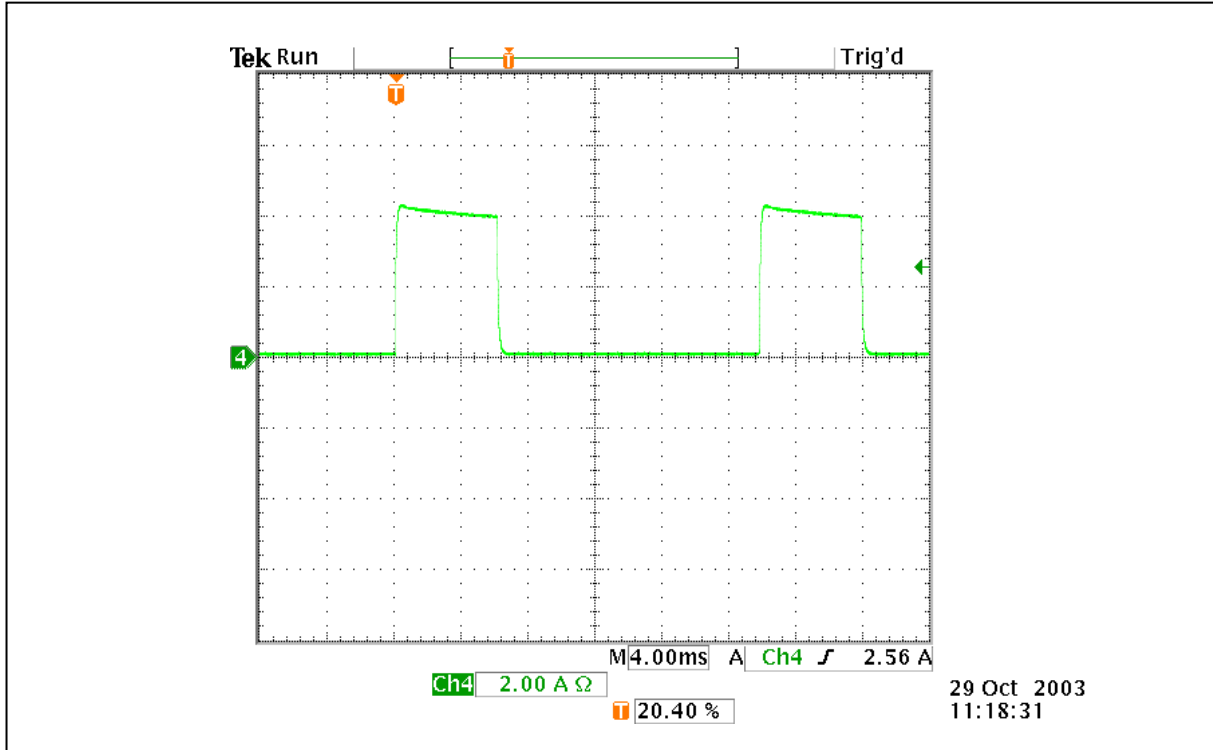


-- Current limit protection (cont.): CH1: V_{OUT} ; CH3: output current



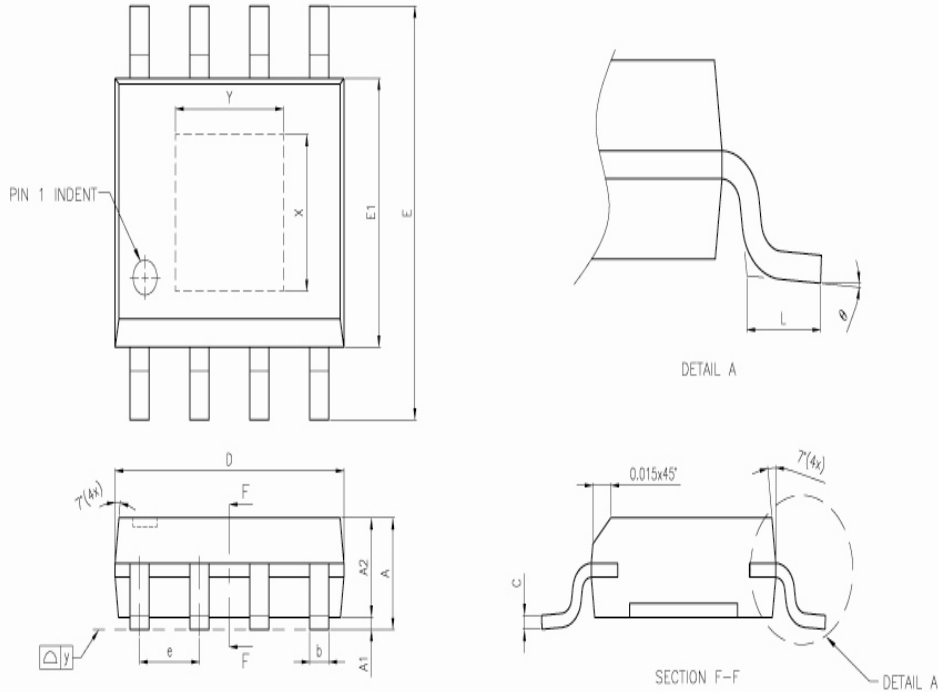


-- Short protection and over temperature protection; CH4: output current





9. PACKAGE DIMENSION (POWER SOP-8)



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 |
| Δ 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 |
| Ø | 0' | — | 8' | 0' | — | 8' |

EXPOSED PAD DIMENSION : (MIL)
PAD SIZE: $\underline{X} \ \underline{Y}$
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 |

11. ORDERING INFORMATION

| PART NUMBER | PACKAGE TYPE |
|-------------|---------------------------|
| W83310S | 8L SOP-8 |
| W83310SG | 8L SOP-8(Pb-free package) |

12. HOW TO READ THE TOP MARKING



Left line: Winbond logo

1st & 2nd lines: W83310S, **W83310SG (Pb-free package)**

3rd line: Tracking code Tracking code 316 G A

316: Packages assembled in Year 03', week 16

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

A: The IC version



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Headquarters

No. 4, Creation Rd. III,
Science-Based Industrial Park,
Hsinchu, Taiwan
TEL: 886-3-5770066
FAX: 886-3-5665577
<http://www.winbond.com.tw/>

Taipei Office

9F, No.480, Rueiguang Rd.,
Neihu District, Taipei, 114,
Taiwan, R.O.C.
TEL: 886-2-8177-7168
FAX: 886-2-8751-3579

Winbond Electronics Corporation America

2727 North First Street, San Jose,
CA 95134, U.S.A.
TEL: 1-408-9436666
FAX: 1-408-5441798

Winbond Electronics Corporation Japan

7F Daini-ueno BLDG, 3-7-18
Shinyokohama Kohoku-ku,
Yokohama, 222-0033
TEL: 81-45-4781881
FAX: 81-45-4781800

Winbond Electronics (Shanghai) Ltd.

27F, 2299 Yan An W. Rd. Shanghai,
200336 China
TEL: 86-21-62365999
FAX: 86-21-62365998

Winbond Electronics (H.K.) Ltd.

Unit 9-15, 22F, Millennium City,
No. 378 Kwun Tong Rd.,
Kowloon, Hong Kong
TEL: 852-27513100
FAX: 852-27552064

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