

2 Amp DDR Bus Termination Regulator

ABSOLUTE MAXIMUM RATINGS

These are stress ratings only and functional operation of the device at these ratings or any other above those indicated in the operation sections of the specifications below is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

Supply Voltage	0.3V to 7.0V
Junction Temperature Range	40°C to +125°C
Storage Temperature	65°C to 150°C

OPERATING RATINGS

Operating Temperature Range	40°C to +85°C
Thermal Resistance θ_{JA}	160°C/W
Thermal Resistance θ_{JC}	40°C/W

ELECTRICAL SPECIFICATIONS

Specifications with standard type are for an Operating Ambient Temperature of $T_A = 25^{\circ}\text{C}$ only; limits applying over the full Operating Junction Temperature range are denoted by a "•". Minimum and Maximum limits are guaranteed through test, design, or statistical correlation. Typical values represent the most likely parametric norm at $T_A = 25^{\circ}\text{C}$, and are provided for reference purposes only. Unless otherwise indicated, $V_{IN} = 2.5\text{V}$, $V_{CNTL} = 3.3\text{V}$, $V_{REF} = 0.5\text{xV}_{IN}$, $C_{OUT} = 10\mu\text{F}$ (ceramic), $T_A = 25^{\circ}\text{C}$.

Parameter	Min.	Тур.	Max.	Units	Conditions	
Input Voltage Range (DDR 1/2) V_{IN}	1.6	2.5/1.8		V	(note 4) Keep V _{CNTL} ≥V _{IN} on operation power on and power off sequences	
Input Voltage Range (DDR 1/2) V _{CNTL}	3.0	3.3	3.6	V	(note 4) I _{OUT} = 0mA	
Output Voltage V _{OUT}		V_{REF}		V	$I_{OUT} = 0mA$	
Output Offset Voltage Vos	-20		+20	mV	No load	
Load Regulation (DDR 1/2) AV		10	25	mV	$I_{OUT} = 0.1 \text{mA to } +2 \text{A}$	
Load Regulation (DDR 1/2) ΔV_{LOR}		10	25	mV	$I_{OUT} = 0.1$ mA to -2A	
Quiescent Current I _Q		8	30	μΑ	$V_{REF} < 0.2V$, $V_{OUT} = OFF$	
Operating Current of V_{CNTL} , I_{CNTL}		3	10	mA	No load	
Bias Current of V _{REF}			1	μA	$V_{REF} = 1.25V$	
Current Limit I _{IL}	2.2	3	4.5	Α	(note 3)	
Thermal Protection						
Thermal Shutdown Temperature T_{SD}	125	150		°C	(note 4) $3.3V \le V_{CNTL} \le 5V$, guaranteed by design	
Thermal Shutdown Hysteresis		30		°C	Guaranteed by design	
Shutdown Specifications						
Chutdown Throspold V	0.8			V	Output ON $V_{REF} = 0V \rightarrow 1.25V$	
Shutdown Threshold V _{TRIGGER}			0.2		Output OFF $V_{REF} = 1.25V \rightarrow 0V$	

Note 1: V_{OS} offset is the voltage measurement defined as V_{OUT} subtracted from V_{REF} .

Note 2: Load regulation is measured at constant junction temperature, using pulse testing with a low ON time.

Note 3: Current limit is measured by pulsing a short time.

Note 4: In order to safely operate your system, V_{CNTL} must be $> V_{\text{IN}}$.





BLOCK DIAGRAM

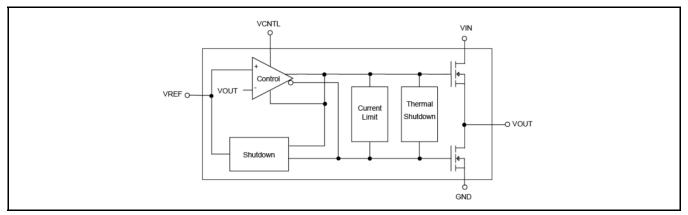


Fig. 2: SP2996B Block Diagram

PIN ASSIGNMENT

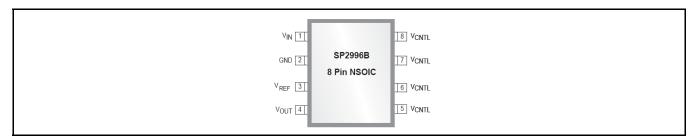


Fig. 3: SP2996B Pin Assignment

PIN DESCRIPTION

Name	Pin Number	Description			
V_{IN}	1	Power Input Voltage			
GND	2	round Signal			
V_{REF}	3	Reference Input Voltage. This input can also be used as an enable signal. Refer to typical application circuit.			
V _{out}	4	Output Voltage			
V_{CNTL}	5				
V_{CNTL}	6	Voltage for the driver circuit and all analog blocks			
V_{CNTL}	7				
V_{CNTL}	8]			

ORDERING INFORMATION

Part Number	Temperature Range	Marking	Package	Packing Quantity	Note 1	Note 2
SP2996BEN-L	-40°C≤T _A ≤+85°C	SP2996BE YYWWL X	SOIC-8	Bulk	Lead Free	
SP2996BEN-L/TR	-40°C≤T _A ≤+85°C	SP2996BE YYWWL X	SOIC-8	2.5K/Tape & Reel	Lead Free	

[&]quot;YY" = Year - "WW" = Work Week - "L" = Lead Free Indicator - "X" = Lot Number; when applicable.



TYPICAL PERFORMANCE CHARACTERISTICS

All data taken at $V_{IN}=2.5V$, $V_{CNTL}=3.3V$, $V_{REF}=0.5xV_{IN}$, $C_{OUT}=10\mu F$ (ceramic), $T_A=25^{\circ}C$, unless otherwise specified - Schematic and BOM from Application Information section of this datasheet.

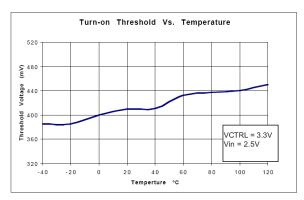


Fig. 4: Turn-on Threshold vs Temperature

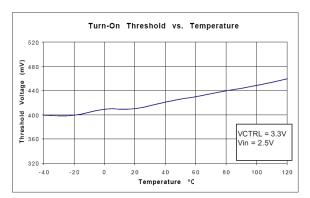


Fig. 5: Turn-on Threshold vs Temperature

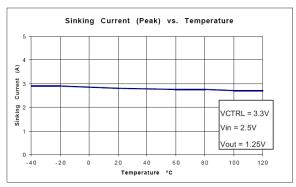


Fig. 6: Sinking Current (Peak) vs Temperature

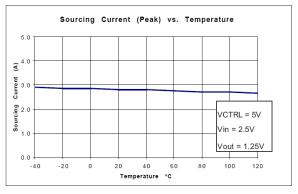


Fig. 7: Sourcing Current (Peak) vs Temperature

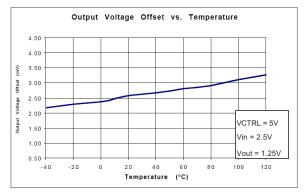


Fig. 8: Output Offset Voltage vs Temperature



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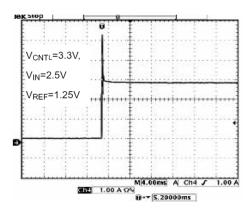


Fig. 9: Output Short Circuit (Sinking)

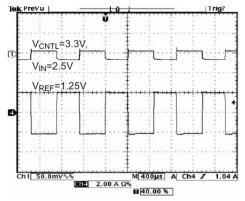


Fig. 11: Transient Response @ 1.25V_™/2A

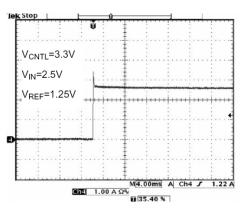


Fig. 10: Output Short Circuit (Sourcing)

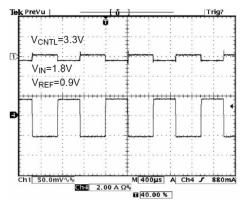


Fig. 12: Transient Response @ $1.25V_{TT}/2A$





APPLICATION INFORMATION

INTERNAL PARASITIC DIODE

Avoid forward-biasing the internal parasitic diode, V_{OUT} to V_{CNTL} , and V_{OUT} to V_{IN} . Positive voltage should not be applied to the output if V_{IN} and V_{CNTL} are not present.

CONSIDERATIONS FOR DESIGNING, RESISTANCE OF VOLTAGE DIVIDER

When the reference voltage is programmed below 0.2V the pulldown capability of the internal NMOS transistor is limited. It is recommened to place a filter capacitor from V_{REF} to ground in order to reduce sensitivity to

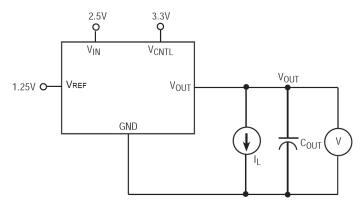
noise and improve power up characteristics (soft start).

LAYOUT CONSIDERATIONS

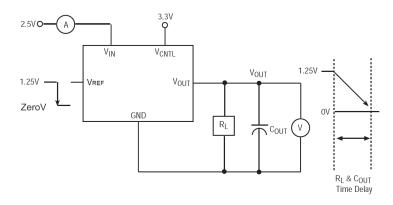
The SP2996B is offered in the NSOIC-8 package, resulting in attention needing to be paid to dissipating heat effectively when it operates in high current. In order to prevent maximum junction temperature from being exceeded, suitable copper area is necessary. The large copper area at VCNTL pins is available, and by taking advantage of this, much heat dissipation is attained. Use vias to direct heat into the bottom layer as the layout examples show below. All capacitors should be placed as close as possible to relative pins.

TEST CIRCUITS

Testing Output Voltage Tolerance △VLOAD

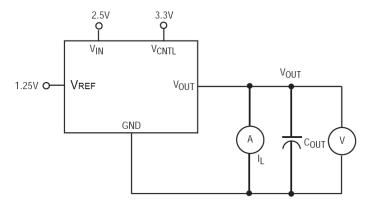


Testing Current in Shutdown Mode I_{SHDN}

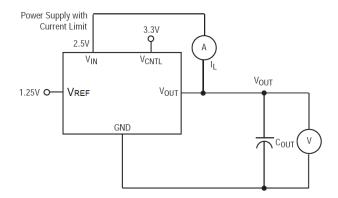




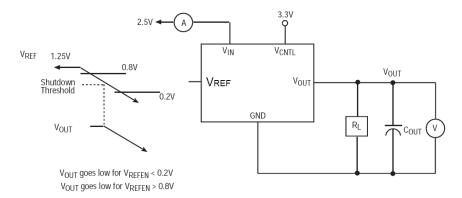
Testing Current Limit for High Side I_{LIMIT}



Testing Current Limit for Low Side I_{Limit}



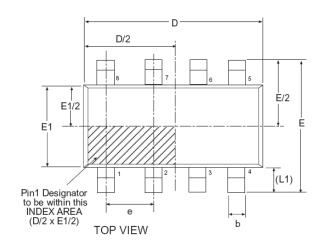
Testing V_{REF} Pin Shutdown Threshold V_{TRIGGER}

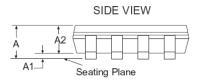


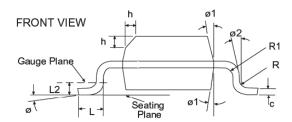


PACKAGE SPECIFICATION

8-PIN NSOIC







8 Pin NSOIC JEDEC MS				S-012	Variation	AA	
SYMBOL	Dimensions in Millimeters: Controlling Dimension			C	Dimensions in Inches Conversion Factor: 1 Inch = 25.40 mm		
	MIN	NOM	MAX	MIN	NOM	MAX	
Α	1.35	-	1.75	0.053	-	0.069	
A1	0.10	-	0.25	0.004	-	0.010	
A2	1.25	ı	1.65	0.049	1	0.065	
b	0.31	1	0.51	0.012	1	0.020	
С	0.17	-	0.25	0.007	-	0.010	
E		6.00 BSC		0.236 BSC			
E1		3.90 BSC		0.154 BSC			
е		1.27 BSC		0.050 BSC			
h	0.25		0.50	0.010	-	0.020	
L	0.40	-	1.27	0.016	-	0.050	
L1		1.04 REF		0.041 REF			
L2		0.25 BSC		0.010 BSC			
R	0.07	-	-	0.003	-	-	
R1	0.07	-	-	0.003	-	-	
Ø	00 -		80	00	-	80	
ø1	50	-	15º	50	-	15°	
ø2	00	-	-	00	-	-	
D	D 4.90 BSC				0.193 BSC		
SIPEX	² kg Signoff	Date/Rev:		J	L Aug16-05 / F	Rev A	



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REVISION HISTORY

Revision	Date	Description
2.0.0		Reformat of data sheet Corrected V_{CTRL} vs V_{CNTL} and V_{REF} annotations

FOR FURTHER ASSISTANCE

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