

# **Dual-Phase DC-DC Controller for AMD Mobile CPU**

### **FEATURES**

- Dual-phase DC-DC controller with integrated drivers
- 6 bit AMD VID codes compatible
- 1% output voltage accuracy
- 6V to 24V input supports 2s to 5s battery power
- Voltage Feed-Forward Compensation
- High efficiency, up to 94%
- High light-load efficiency: 80% at 200mA
- Non-audio skip mode
- Constant Ripple-Current topology facilitates optimum inductor size
- Supports 60A output current
- Ultra-fast transient recovery
- Adjustable load line support
- Slew control at start-up and OTF VID changes
- True differential output voltage remote sensing
- AMD compliant Power Good signal
- VIN & VDDA Undervoltage Lockout Protection
- Latched over-voltage protection
- Cycle-by-cycle Overcurrent protection with latched timeout
- Small, thin 5x5 QFN32 package

### **APPLICATIONS**

Notebook CPU power supplies

### ORDERING INFORMATION

Part Number	Temp Range	Package
OZ826LN	0°C to 85°C	32 QFN 5x5mm

## **GENERAL DESCRIPTION**

OZ826 is a DC/DC controller specifically developed to support the design of power supplies for AMD mobile microprocessors supporting the 6 bit VID codes (see **Table 1**). Its high efficiency under both light and heavy load conditions, DC accuracy, remote voltage sensing and excellent transient response make it a good choice for low voltage CPUs.

The core topology is based on a constant-ripple current sync-buck controller with integrated drivers. The voltage feed-forward compensation ensures a high rejection of input voltage transients.

Overvoltage Protection (OVP) acts when the output voltage exceeds the 1.8V threshold. This protection condition is latched and the shutdown occurs. After an OVP event, the EN pin should be toggled or VDDA cycled to restart the circuit.

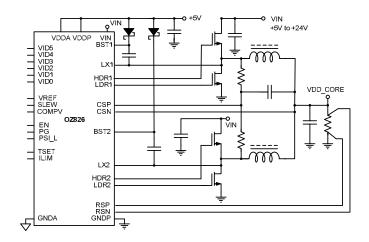
Under Voltage Lockout (UVLO) circuit monitors both VDDA and VIN. Shut down occurs when VDDA falls below 4.2V or VIN is less than typically 4.8V.

The output is protected against overload by a cycle-bycycle Overcurrent Protection (OCP) circuit. Its limit is useradjustable. Maximum OCP timeout is typically 1ms.

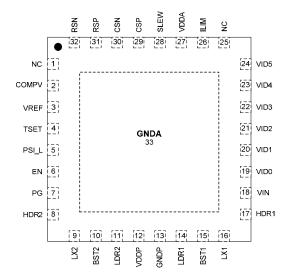
The Power Good (PG) signal is open drain unless the output voltage drops more than 250mV off the set VID.

At start-up the output voltage ramps up in a controlled manner with an externally adjustable slew rate.

# SIMPLIFIED APPLICATION DIAGRAM



## **PIN DIAGRAM**

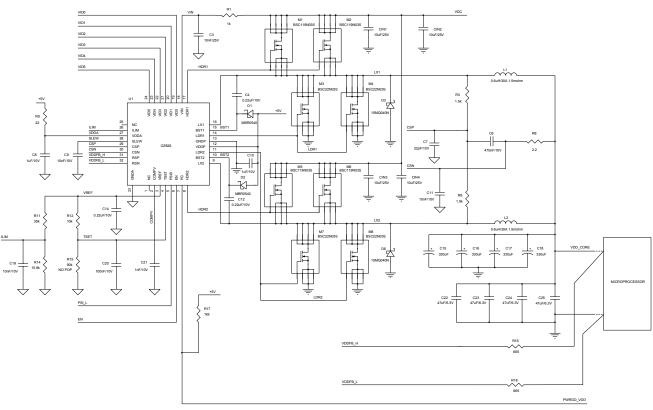


# PIN DESCRIPTION

No.	Name	I/O	Туре	Description	
1	NC	-	-	No internal connection	
2	COMPV	I/O	Analog	Compensation pin. Requires a capacitor to analog ground	
3	VREF	0	Analog	1.55V, +/-1% precision reference voltage	
4	TSET	I	Analog	Adjusts the on time interval	
5	PSI_L	- 1	Digital	Enables skip mode of operation when asserted low, $120k\Omega$ internal pull down resistor	
6	EN	I	Digital	Enables the controller operation. When asserted high, initiates the startup sequence. 120kΩ internal pull down resistor	
7	PG	0	Digital	Power good open drain output. It only provides an indication that the output voltage is within VID set voltage -250mV	
8	HDR2	0	Digital	Output of the high side driver of phase 2	
9	LX2	Р	Power	Inductor switching node for phase 2	
10	BST2	Р	Power	Positive supply for the high side driver of phase 2. A 0.22µF capacitor should be placed between BST2 and LX2	
11	LDR2	0	Digital	Output of the low side driver of phase 2	
12	VDDP	Р	Power	Power supply for the low side drivers	
13	GNDP	Р	Power	Power ground for low side drivers	
14	LDR1	0	Digital	Output of the low side driver of phase 1	
15	BST1	Р	Power	Positive supply for the high side driver of phase 1. A 0.22µF capacitor should be placed between BST1 and LX1	
16	LX1	Р	Power	Inductor switching node for phase 1	
17	HDR1	0	Digital	Output of the high side driver of phase 1	
18	VIN	ı	Analog	Sensing pin for the input voltage of the power stage	
19	VID0	ı	Digital	Voltage Identification pin, bit 0, 120kΩ internal pull down resistor	
20	VID1	ı	Digital	Voltage Identification pin, bit 1, 120kΩ internal pull down resistor	
21	VID2	ı	Digital	Voltage Identification pin, bit 2, 120kΩ internal pull down resistor	
22	VID3	- 1	Digital	Voltage Identification pin, bit 3, 120kΩ internal pull down resistor	
23	VID4	- 1	Digital	Voltage Identification pin, bit 4, 120kΩ internal pull down resistor	
24	VID5	I	Digital	Voltage Identification pin, bit 5, 120kΩ internal pull down resistor	
25	NC	-	-	No internal connection	
26	ILIM	I	Analog	Sets the current limit threshold	
27	VDDA	Р	Power	+5V supply for the controller analog circuits.	
28	SLEW	I/O	Analog	Controls the slew rate of the output voltage during start up and OTF VID code change	
29	CSP	- 1	Analog	Non-inverting current sense pin; also provides voltage feedback information	
30	CSN	I	Analog	Inverting current sense pin	
31	RSP	I	Analog	Non-inverting voltage remote sense pin	
32	RSN	I	Analog	Inverting voltage remote sense pin	
33	GNDA	Р	Power	Ground for the controller analog circuits	

OZ826-SF-v1.0 Page 2

# TYPICAL APPLICATION SCHEMATIC



Typical Application Schematic: Dual Phase AMD Mobile CPU Core Power Supply with 60A Load Current Capability

OZ826-SF-v1.0 Page 3

# **BILL OF MATERIALS**

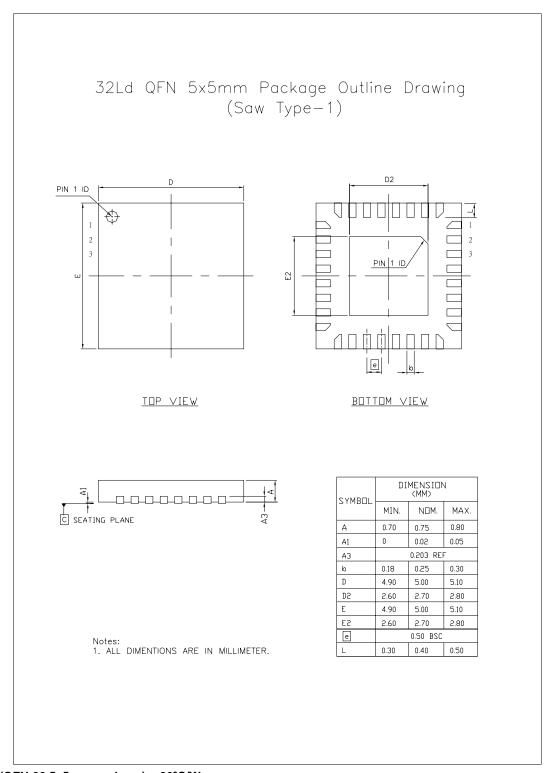
Item	Qty	Reference	Value	Vendor Part Number
1	4	CIN1,CIN2,CIN3,CIN4	10μF/25V	C4532X7R1E106M <b>TDK</b> 250S43X5R106M <b>Johanson Dielectrics</b>
2	1	C3	10nF/50V	Ceramic – X7R or X5R
3	3	C4, C12, C14	220nF/10V	Ceramic – X7R or X5R
4	1	C6	470nF/10V	Ceramic – X7R or X5R
5	1	C7,	22pF/10V	Ceramic – X7R or X5R
6	2	C8, C10	1μF/10V	C1608X5R1A105K <b>TDK</b> 100R14X5R105M <b>Johanson Dielectrics</b>
7	3	C9, C11, C19	10nF/10V	Ceramic – X7R or X5R
8	4	C15, C16, C17, C18	330µF/2.5V	SPCAP, POSCAP, OSCON
9	1	C20	100nF	Ceramic – X7R or X5R
10	1	C21	1nF/10V	Ceramic – X7R or X5R
11	4	C22, C23, C24, C25	47uF/6.3V	630S43X5R476MJohanson Dielectrics
12	2	D1, D2	MBR0540	International Rectifier, Vishay Siliconix
13	2	D3, D4	15MQ040N	International Rectifier, Vishay Siliconix
14	2	L1, L2	0.6μH/30A 1.5mΩ	FDH1055 0R56 TOKO
15	4	M1, M2, M5, M6	BSC119N03S	Infineon
16	4	M3, M4, M7, M8	BSC022N03S	Infineon
17	1	R1	1k	Any
18	2	R3, R9	1.5k	Any
19	1	R5	22	Any
20	1	R8	2.2	Any
21	1	R11	35k	Any
22	1	R12	10k	Any
23	1	R14	15.8k	Any
24	2	R16, R18	665	Any
25	1	R17	1.9k	Any
26	1	U1	OZ826	O₂Micro, Inc.

# **COMPONENT SUPPLIERS**

Manufacturer	Contact Information				
Manufacturer	Phone	Website			
Power MOSFETs					
Fairchild Semiconductor	888-522-5372 (USA)	www.fairchildsemi.com			
International Rectifier	310-322-3331 (USA)	www.irf.com			
Siliconix (Vishay)	203-268-6261 (USA)	www.vishay.com			
Philips	408-474-8142 (USA)	www.semiconductors.philips.com			
Infineon	858-526-2201 (USA)	www.infineon.com			
Magnetics/Inductors					
Coilcraft	800-322-2645 (USA)	www.coilcraft.com			
Coiltronics	561-752-5000 (USA)	www.coiltronics.com			
TOKO	858-675-8013 (USA)	www.tokoam.com			
Sumida	408-982-9660 (USA)	www.sumida.com			
Capacitors					
Sanyo	65-6281-3226 (Singapore)	www.secc.co.jp			
Kemet	408-986-0424 (USA)	www.kemet.com			
Other Components					
TDK	847-803-6100 (USA) 81-3-5201-7241 (Japan)	www.component.tdk.com			
Taiyo Yuden	03-3667-3408 (Japan) 408-573-4150 (USA)	www.t-yuden.com			

## **PACKAGE INFORMATION - 32 PIN QFN**

Exposed pad is GNDA (pin 33) and must be soldered to PCB

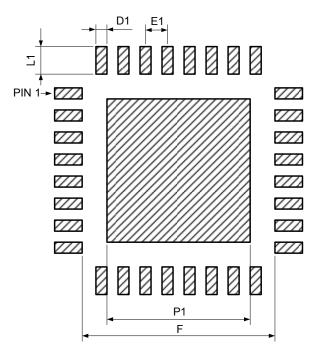


Rth j-a (QFN-32 5x5mm package) = 26°C/W

### **DIMENSION TABLE**

SYMBOL	SPECIFICATION	
OTWIDOL	32L QLP 5X5 BODY	
D1	0.25	
E1	0.50	
L1	0.94	
P1	2.8	
F	4.25	

### **RECOMMENDED LANDING PATTERN**



### IMPORTANT NOTICE

No portion of  $O_2$ Micro specifications/datasheets or any of its subparts may be reproduced in any form, or by any means, without prior written permission from  $O_2$ Micro.

 $O_2$ Micro and its subsidiaries reserve the right to make changes to their datasheets and/or products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgment, including those pertaining to warranty, patent infringement, and limitation of liability.

 $O_2$ Micro warrants performance of its products to the specifications applicable at the time of sale in accordance with  $O_2$ Micro's standard warranty. Testing and other quality control techniques are utilized to the extent  $O_2$ Micro deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

Customer acknowledges that  $O_2$ Micro products are not designed, manufactured or intended for incorporation into any systems or products intended for use in connection with life support or other hazardous activities or environments in which the failure of the  $O_2$ Micro products could lead to death, bodily injury, or property or environmental damage ("High Risk Activities").  $O_2$ Micro hereby disclaims all warranties, and  $O_2$ Micro will have no liability to Customer or any third party, relating to the use of  $O_2$ Micro products in connection with any High Risk Activities.

Any support, assistance, recommendation or information (collectively, "Support") that O<sub>2</sub>Micro may provide to you (including, without limitation, regarding the design, development or debugging of your circuit board or other application) is provided "AS IS." O<sub>2</sub>Micro does not make, and hereby disclaims, any warranties regarding any such Support, including, without limitation, any warranties of merchantability or fitness for a particular purpose, and any warranty that such Support will be accurate or error free or that your circuit board or other application will be operational or functional. O<sub>2</sub>Micro will have no liability to you under any legal theory in connection with your use of or reliance on such Support.

COPYRIGHT © 2005-2008. O2Micro International Limited