OZ990

Intelligent Manager
Smart PMU/GPIO

FEATURES

- SMBus 1.0 Compliant
- Support Pentium class and x86-based designs
- PMU, GPIO, and Alternative PMU modes
- WAKE output and Suspend Status input operates synchronously with PMU in notebook chipsets
- LOW power-saving Suspend mode
- Hardware Debounced Wakeup/Suspend input as pushbutton
- 4 Power Control programmable outputs with built-in Power Sequencing at 10 ms to 1 second programmable intervals
- Optional Wakeup-Disable inputs
- Optional Power-On inputs
- 8 programmable interrupt inputs for SMIEVENT or SMBALERT#
- 8 Suspend/Wakeup edge-triggered programmable inputs
- 20 possible programmable edge-sensitive General Purpose Inputs/Outputs
- 8 Auto LED Flash(ALF) programmable outputs with 10% or 50% duty cycles
- LOW power hardware driven speaker alarm output
- Up to 6 programmable unique addresses for device cascade
- 8 power-on modularized hardware ID programmable inputs
- 32KHz operating frequency
- 5 V tolerant inputs
- Supports both 3.3 V and 5 V operating environments
- Software programming kit available

ORDERING INFORMATION

OZ990S - 28 SSOP

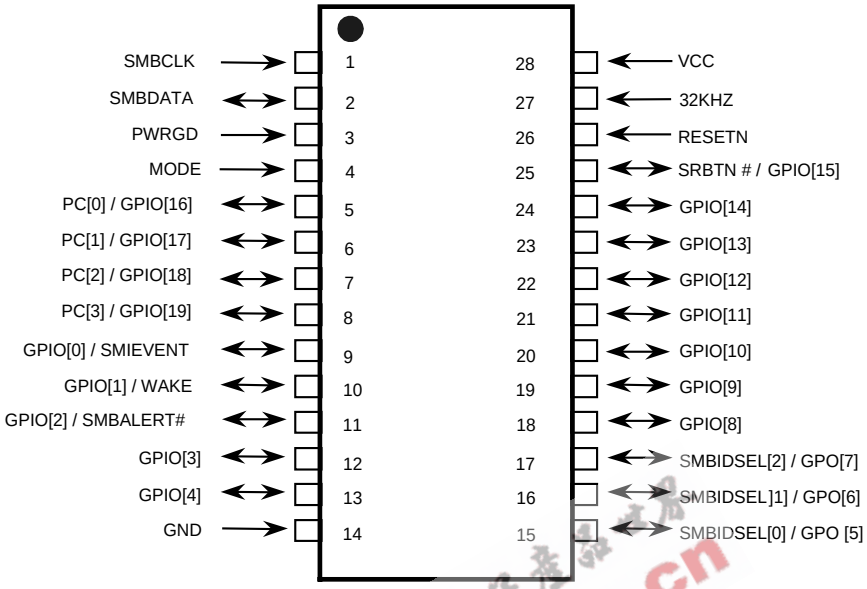
GENERAL DESCRIPTION

O_2Micro's OZ990 Smart PMU/GPIO (Power Management Unit/General Purpose Input Output) unit allows the **implementation of Green PC Desktop Chipsets** in notebook designs at considerably lower cost than conventional methods while closing the technology gap between desktop and notebook computers by offering an extensive number of powerful power management and general purpose I/O features. With the OZ990 stand-alone PMU capability, the ability to provide the **One-Shot Design for PMU/BIOS** practically eliminates the need to redesign PMUs to match the ever-changing core logic chipsets. The OZ990 provides the perfect solution for leading notebook vendors to stay ahead of the competition.

The OZ990 is an SMBus 1.0 compliant device with **4 Power Control and 16 Programmable General Purpose I/Os pins** flexible for a variety of functions such as Power Control with sequencing, programmable inputs/outputs, SMB/SMI interrupt service, power-saving, Suspend/Wakeup, modularized hardware ID, and Auto LED Flash (ALF) status display. Other features include hardware-driven speaker alarm output and Suspend/Wakeup button.

As a Pentium class and x86-based system compatible device, the OZ990 is a highly cost-effective and practical solution for today's notebook and palmtop computers, pen-based data systems, personal digital assistants, and portable data-collection terminals.

PIN ASSIGNMENT



PIN CONFIGURATION

Name	Pin No.	Type	Input	Drive	Definition
SMBCLK	1	I	TTL	-	**SMBus Clock Input**
	SMBus Clock Input for SMBus protocol communication.				
SMBDATA	2	I/O	TTL	12mA	**SMBus Data Input/Output**
	SMBus Data Input/Output for SMBus protocol communication.				
PWRGD	3	I	TTL	-	**Host System Power Good**
	This pin indicates that the host system's power, including the Core Logic chipsets, is stable. Before the host system's power is stable, this input pin will tri-state all the output pins from OZ990 with the exception of the Power Control pins. The state of the PWRGD pin determines whether the OZ990 is in PMU or Alternate PMU mode when RESETN is active. When pin MODE=1 and pin PWRGD=0, the OZ990 is in PMU mode. When pin MODE=1 and pin PWRGD=1, the OZ990 is in Alternate PMU mode.				
MODE	4	I	TTL	-	**OZ990 Mode Input**
	The OZ990 has 3 modes of operation: GPIO(with 20 GPIOs available), PMU(with 16 GPIOs available), and Alternate PMU(with 16 GPIOs available). To use the OZ990 as a PMU, tie MODE pin to VDD and set PWRGD LOW. For Alternate PMU mode, tie MODE pin to VDD and set PWRGD HIGH. For GPIO-only mode, tie MODE pin LOW. Refer to MODE description for more details.				
PC[3:0]/ GPIO[19:16]	[8:5]	I/O	TTL	4mA	**Power Control Outputs / General Purpose I/Os**
	Pins PC[3:0]/GPIO[19:16] can be used as Power Control outputs for cold start, reset, Suspend, and Wakeup or as regular GPIOs. Upon power up, if the OZ990 is in PMU mode, PC[3:0] will default to 0, with OZ990 initially in Suspend mode. By default, on a falling edge-triggered SRBTN#/GPIO[15] (with Wakeup function), PC[3:0] will be set to 1 to power on the system. On a subsequent trigger of GPIO[15:8]'s Suspend and Wakeup functions, the values in PC_SUSPEND[3:0] and PC_WAKE[3:0] in register 0Bh will be copied onto the PC[3:0] output pins. Additionally, the OZ990 provides a power sequencing feature that allows up to 8 different programmable values of staggering time for the PC[3:0] outputs. PC[3:0] are also programmable just like the GPIO[19:16] pins but with bits PCI[3:0] in register 0Bh as input data and PCO[3:0] in register 0Ch as output data values.				
GPIO[0]/ SMIEVENT	9	I/O	TTL	4mA	**General Purpose I/O / SMIEVENT**
	Fully programmable GPIOs that can be used for a variety of dedicated or specific functions. Pin GPIO[0] has SMIEVENT output as an alternate function. GPIO[0] defaults as outputs in PMU mode, and as input in Alternate PMU and GPIO modes. It is also programmable to function as either GPI[0] input, GPO[0]output, ALF[0] output, PWRON input, WAKE_DIS input, or ID[0] input(in Alternate PMU and GPIO modes). When implementing as ID[0] input, GPIO[0]/SMIEVENT pin is internally latched from external pull-ups or pull-downs, when RESETN is LOW. The values will be stored permanently in the ID Register and GPIO[0]/SMIEVENT pin can then be reconfigured as an output. Refer to GPIO Config.1&2 Registers for more details and GPIO Config. Tables for input/output selections.				

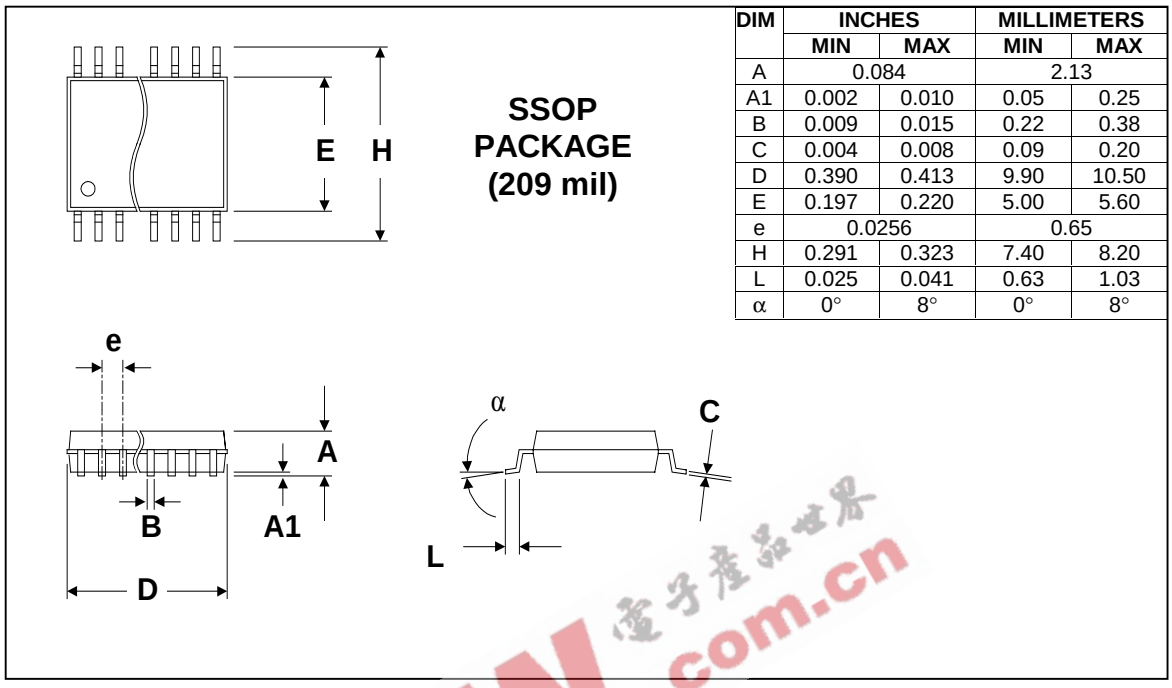
Name	Pin No.	Type	Input	Drive	Definition
GPIO[1]/ WAKE	10	I/O	TTL	4mA	**General Purpose I/O / WAKE**
	Fully programmable GPIO that can be used for a variety of dedicated or specific functions. Pin GPIO[1] has WAKE output as an alternate function. GPIO[1] pin defaults as WAKE output in PMU mode, and as input in Alternate PMU and GPIO modes. It is also programmable to function as GPI[1] input, GPO[1]output, ALF[1] output, PWRON input, WAKE_DIS input, or ID[1] input. When implementing as ID[1] input, GPIO[1]/WAKE pin is internally latched from external pull-ups or pull-downs, when RESETN is LOW. The values will be stored permanently in the ID Register and GPIO[1]/WAKE pin can then be reconfigured as an output. Refer to GPIO Config.1&2 Registers for more details and GPIO Config. Tables for input/output selections.				
GPIO[2]/ SMBALERT#	11	I/O	TTL	4mA	**General Purpose I/O / SMBALERT#**
	Fully programmable GPIO that can be used for a variety of dedicated or specific functions. Pin GPIO[2] defaults as input in all modes. This pin, when programmed as an alternate function, can generate the SMBALERT# interrupt. SMBALERT# is an interrupt service request signal to the SMBus Host which can be generated by all devices connected to the OZ990. Pin GPIO[2]/SMBALERT# is also programmable to function as either GPI[2] input, GPO[2] output, ALF[2] output, PWRON input, WAKE_DIS input, or ID[2] input. When implementing as ID[2] input, GPIO[2]/SMBALERT# pin is internally latched from external pull-ups or pull-downs, when RESETN is LOW. The latched values will be stored permanently in the ID Register and GPIO[2] pin can then be reconfigured as an output. Refer to GPIO Config.1&2 Registers for more details and GPIO Config. Tables for I/O selections.				
GPIO[4:3]	[13:12]	I/O	TTL	4mA	**General Purpose I/Os**
	Fully programmable GPIOs that can be used for a variety of dedicated or specific functions. Pins GPIO[4:3] default as inputs in all modes. They are programmable to function as GPI[4:3] inputs, GPO[4:3] outputs, ALF[4:3] outputs, PWRON inputs, WAKE_DIS inputs, or ID[4:3] inputs. When implemented as ID[4:3] inputs, GPIO[4:3] pins are internally latched from external pull-ups or pull-downs, when RESETN is LOW. The values will be stored permanently in the ID Register. GPIO[4:3] pins can then be reconfigured as outputs. Refer to GPIO Config.1&2 Registers for more details and GPIO Config. Tables for input/output selections.				
SMBIDSEL [2:0]/ GPO[7:5]	[17:15]	I/O-U	TTL	4mA	**SMBus ID Selects/ General Purpose Outputs**
	Fully programmable GPIO that can be used for a variety of dedicated or specific functions. Pin SMBIDSEL[2:0]/GPO[7:5] defaults as an input in all modes. Upon power on, when RESETN is LOW, these pins are internally latched to determine which SMBus address is used for the OZ990. It is also programmable to function as either GPO[7:5] or ALF[7:5] outputs.				
GPIO[14:8]	[24:18]	I/O	TTL	4mA	**General Purpose I/Os**
	Fully programmable GPIOs that can be used for a variety of dedicated or specific functions. Pins GPIO[14:8] default as inputs in all modes. Pins GPIO[14:8] as inputs are programmable to generate SMI/SMB interrupts and WAKE signal(pin GPIO[1]), to enter Suspend mode, or to resume Wakeup mode from Suspend (with/without interrupt generation). They are also programmable to function as GPI[14:8] inputs, GPO[14:8] outputs, PWRON inputs, or WAKE_DIS inputs. Refer to GPIO Config.1&2 Registers for more details and GPIO Config. Tables for input/output selections.				
SRBTN#/ GPIO[15]	25	I/O	TTL	4mA	**Suspend/Resume Button / General Purpose I/O**
	Fully programmable GPIO that can be used for a variety of dedicated or specific functions. In PMU mode, this pin defaults as SRBTN# with a debounced input with “Wakeup” function triggered on the falling edge to turn on pins PC[3:0] (PC[3:0]=1). This pin can be tied to a pushbutton to toggle between Suspend/Wakeup modes. In Alternate PMU and GPIO modes, pin GPIO[15] defaults as input. This pin is programmable to generate an SMB/SMI interrupt and WAKE signal(pin GPIO[1]), to enter Suspend mode, resume Wakeup mode from Suspend (with/without interrupt generation). This pin is also programmable to function as GPI[15] input, GPO[15] output, PWRON input, or WAKE_DIS input. Refer to GPIO Config.1&2 Registers for more details and GPIO Config. Tables for input/output selections.				
RESETN	26	I	TTL	-	**Reset**
	OZ990 hardware reset. RESETN(active LOW) resets all registers to their default values. This pin is connected to the RC delay from the power supplied to OZ990.				
32KHz	27	I	TTL	-	**32KHz Clock Input**
	32KHz Clock Input.				
GND	14	GND	-	-	**Ground**
	Ground.				
VCC	28	PWR	-	-	**3.3V/5V Power Supply**
	3.3V or 5V Power Supply.				

GPIO PINS ALTERNATE USAGE

Name	Default Usage			Alternate Usage
	PMU Mode	Alt PMU mode	GPIO mode	
	MODE=1 PWRGD=0	MODE=1 PWRGD=1	MODE=0	
PC[0] / GPIO[16]	PCO[0]	PCO[0]	GPI[16]	GPI[16], GPO[16]
PC[1] / GPIO[17]	PCO[1]	PCO[1]	GPI[17]	GPI[17], GPO[17]
PC[2] / GPIO[18]	PCO[2]	PCO[2]	GPI[18]	GPI[18], GPO[18]
PC[3] / GPIO[19]	PCO[3]	PCO[3]	GPI[19]	GPI[19], GPO[19]
GPIO[0]/SMIEVENT	GPO[0] (SMIEVENT)	GPI[0]	GPI[0]	GPI[0], GPO[0] ALF[0] ID[0] DIS_WAKE PWRON
GPIO[1]/WAKE	GPO[1] (WAKE)	GPI[1]	GPI[1]	GPI[1], GPO[1] ALF[1] ID[1] DIS_WAKE PWRON
GPIO[2]/SMBALERT#	GPI[2]	GPI[2]	GPI[2]	SMBALERT# GPO[2] ALF[2] ID[2] DIS_WAKE PWRON
GPIO[3]	GPI[3]	GPI[3]	GPI[3]	GPO[3] ALF[3] ID[3] DIS_WAKE PWRON
GPIO[4]	GPI[4]	GPI[4]	GPI[4]	GPO[4] ALF[4] ID[4] DIS_WAKE PWRON
SMBIDSEL[0]/GPO[5]	GPI[5]	GPI[5]	GPI[5]	GPO[5] ALF[5]
SMBIDSEL[1]/GPO[6]	GPI[6]	GPI[6]	GPI[6]	GPO[6] ALF[6]
SMBIDSEL[2]/GPO[7]	GPI[7]	GPI[7]	GPI[7]	GPO[7] ALF[7]
GPIO[8]	GPI[8]	GPI[8]	GPI[8]	GPO[8] DIS_WAKE PWRON
GPIO[9]	GPI[9]	GPI[9]	GPI[9]	GPO[9] DIS_WAKE PWRON
GPIO[10]	GPI[10]	GPI[10]	GPI[10]	GPO[10] DIS_WAKE PWRON
GPIO[11]	GPI[11]	GPI[11]	GPI[11]	GPO[11] DIS_WAKE PWRON
GPIO[12]	GPI[12]	GPI[12]	GPI[12]	GPO[12] DIS_WAKE PWRON
GPIO[13]	GPI[13]	GPI[13]	GPI[13]	GPO[13] DIS_WAKE PWRON
GPIO[14]	GPI[14]	GPI[14]	GPI[14]	GPO[14] DIS_WAKE PWRON
SRBTN#/GPIO[15]	GPI[15] (has 'Wake-up' function)	GPI[15]	GPI[15]	GPO[15] DIS_WAKE PWRON

Note: GPI[15:8] are SMI/SMB interruptible.

OZ990 PACKAGE INFORMATION



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.084		2.13	
A1	0.002	0.010	0.05	0.25
B	0.009	0.015	0.22	0.38
C	0.004	0.008	0.09	0.20
D	0.390	0.413	9.90	10.50
E	0.197	0.220	5.00	5.60
e	0.0256		0.65	
H	0.291	0.323	7.40	8.20
L	0.025	0.041	0.63	1.03
α	0°	8°	0°	8°