Kernel driver w83791d

Supported chips:

- Winbond W83791D

  Prefix: 'w83791d'

  Addresses scanned: I2C 0x2c - 0x2f

  Datasheet: http://www.winbond-usa.com/products/winbond_products/pdfs/PCIC/W83791D_W83791Gb.pdf

Author: Charles Spirakis <bezaur@gmail.com>

This driver was derived from the w83781d.c and w83792d.c source files.

Credits:

w83781d.c:

- Frodo Looijaard <frodol@dds.nl>,
- Philip Edelbrock <phil@netroedge.com>,
- Mark Studebaker <mdsxyz123@yahoo.com>

w83792d.c:

- Shane Huang (Winbond),
- Rudolf Marek <r.marek@assembler.cz>

Additional contributors:

- Sven Anders <anders@anduras.de>
- Marc Hulsman <m.hulsman@tudelft.nl>

Module Parameters

- init boolean

  (default 0)

  Use 'init=1' to have the driver do extra software initializations. The default behavior is to do the minimum initialization possible and depend on the BIOS to properly setup the chip. If you know you have a w83791d and you're having problems, try init=1 before trying reset=1.

- reset boolean

  (default 0)

  Use 'reset=1' to reset the chip (via index 0x40, bit 7). The default behavior is no chip reset to preserve BIOS settings.

- force_subclients=bus,caddr,saddr,saddr

  This is used to force the i2c addresses for subclients of a certain chip. Example usage is *force_subclients=0,0x2f,0x4a,0x4b* to force the subclients of chip 0x2f on bus 0 to i2c addresses 0x4a and 0x4b.

Description

This driver implements support for the Winbond W83791D chip. The W83791G chip appears to be the same as the W83791D but is lead free.

Detection of the chip can sometimes be foiled because it can be in an internal state that allows no clean access (Bank with ID register is not currently selected). If you know the address of the chip, use a 'force' parameter; this will put it into a more well-behaved state first.

The driver implements three temperature sensors, ten voltage sensors, five fan rotation speed sensors and manual PWM control of each fan.

Temperatures are measured in degrees Celsius and measurement resolution is 1 degC for temp1 and 0.5 degC for temp2 and temp3. An alarm is triggered when the temperature gets higher than the Overtemperature Shutdown value; it stays on until the temperature falls below the Hysteresis value.

Voltage sensors (also known as IN sensors) report their values in millivolts. An alarm is triggered if the voltage has crossed a programmable minimum or maximum limit.

Fan rotation speeds are reported in RPM (rotations per minute). An alarm is triggered if the rotation speed has dropped below a programmable limit. Fan readings can be divided by a programmable divider (1, 2, 4, 8, 16, 32, 64 or 128 for all fans) to give the readings more range or accuracy.

Each fan controlled is controlled by PWM. The PWM duty cycle can be read and set for each fan separately. Valid values range from 0 (stop) to 255 (full). PWM 1-3 support Thermal Cruise mode, in which the PWMs are automatically regulated to keep respectively temp 1-3 at a certain target temperature. See below for the description of the sysfs-interface.

The w83791d has a global bit used to enable beeping from the speaker when an alarm is triggered as well as a bitmask to enable or disable the beep for specific alarms. You need both the global beep enable bit and the corresponding beep bit to be on for a triggered alarm to sound a beep.

The sysfs interface to the global enable is via the sysfs beep_enable file. This file is used for both legacy and new code.

The sysfs interface to the beep bitmask has migrated from the original legacy method of a single sysfs beep_mask file to a newer method using multiple *_beep* files as described in *Documentation/hwmon/sysfs-interface.rst*.

A similar change has occurred for the bitmap corresponding to the alarms. The original legacy method used a single sysfs alarms file containing a bitmap of triggered alarms. The newer method uses multiple sysfs *_alarm* files (again following the pattern described in sysfs-interface).

Since both methods read and write the underlying hardware, they can be used interchangeably and changes in one will automatically be reflected by the other. If you use the legacy bitmask method, your user-space code is responsible for handling the fact that the alarms and beep_mask bitmaps are not the same (see the table below).

NOTE: All new code should be written to use the newer sysfs-interface specification as that avoids bitmap problems and is the preferred interface going forward.

The driver reads the hardware chip values at most once every three seconds. User mode code requesting values more often will receive cached values.

/sys files

The sysfs-interface is documented in the 'sysfs-interface' file. Only chip-specific options are documented here.

pwm[1-3]_enable	this file controls mode of fan/temperature control for fan 1-3. Fan/PWM 4-5 only support manual mode. • 1 Manual mode • 2 Thermal Cruise mode • 3 Fan Speed Cruise mode (no further support)
temp[1-3]_target	defines the target temperature for Thermal Cruise mode. Unit: millidegree Celsius RW
temp[1-3]_tolerance	temperature tolerance for Thermal Cruise mode. Specifies an interval around the target temperature in which the fan speed is not changed. Unit: millidegree Celsius RW

Alarms bitmap vs. beep_mask bitmask

For legacy code using the alarms and beep_mask files:

Signal	Alarms	beep_mask	Obs
in0 (VCORE)	0x000001	0x000001	
in1 (VINR0)	0x000002	0x002000	<== mismatch
in2 (+3.3VIN)	0x000004	0x000004	
in3 (5VDD)	0x000008	0x000008	
in4 (+12VIN)	0x000100	0x000100	
in5 (-12VIN)	0x000200	0x000200	
in6 (-5VIN)	0x000400	0x000400	
in7 (VSB)	0x080000	0x010000	<== mismatch
in8 (VBAT)	0x100000	0x020000	<== mismatch
in9 (VINR1)	0x004000	0x004000	
temp1	0x000010	0x000010	
temp2	0x000020	0x000020	
temp3	0x002000	0x000002	<== mismatch
fan1	0x000040	0x000040	
fan2	0x000080	0x000080	
fan3	0x000800	0x000800	
fan4	0x200000	0x200000	
fan5	0x400000	0x400000	
tart1	0x010000	0x040000	<== mismatch

Signal	Alarms	beep_mask	Obs
tart2	0x020000	0x080000	<== mismatch
tart3	0x040000	0x100000	<== mismatch
case_open	0x001000	0x001000	
global_enable	•	0x800000	(modified via beep_enable)