

Kernel driver w83627ehf

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Supported chips:

- * Winbond W83627EHF/EHG (ISA access ONLY)
Prefix: 'w83627ehf'
Addresses scanned: ISA address retrieved from Super I/O registers
Datasheet:

<http://www.nuvoton.com.tw/NR/ronlyres/A6A258F0-F0C9-4F97-81C0-C4D29E7E943E/0/W83627EHF.pdf>

- * Winbond W83627DHG
Prefix: 'w83627dhg'
Addresses scanned: ISA address retrieved from Super I/O registers
Datasheet:

<http://www.nuvoton.com.tw/NR/ronlyres/7885623D-A487-4CF9-A47F-30C5F73D6FE6/0/W83627DHG.pdf>

- * Winbond W83627DHG-P
Prefix: 'w83627dhg'
Addresses scanned: ISA address retrieved from Super I/O registers
Datasheet: not available
- * Winbond W83667HG
Prefix: 'w83667hg'
Addresses scanned: ISA address retrieved from Super I/O registers
Datasheet: not available

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Description

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This driver implements support for the Winbond W83627EHF, W83627EHG, W83627DHG, W83627DHG-P and W83667HG super I/O chips. We will refer to them collectively as Winbond chips.

The chips implement three temperature sensors, five fan rotation speed sensors, ten analog voltage sensors (only nine for the 627DHG), one VID (6 pins for the 627EHF/EHG, 8 pins for the 627DHG and 667HG), alarms with beep warnings (control unimplemented), and some automatic fan regulation strategies (plus manual fan control mode).

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 high limit; it stays on until the temperature falls below the hysteresis value.

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) to give the readings more range or accuracy. The driver sets the most

suitable fan divisor itself. Some fans might not be present because they share pins with other functions.

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.

The driver supports automatic fan control mode known as Thermal Cruise. In this mode, the chip attempts to keep the measured temperature in a predefined temperature range. If the temperature goes out of range, fan is driven slower/faster to reach the predefined range again.

The mode works for fan1-fan4. Mapping of temperatures to pwm outputs is as follows:

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temp1 -> pwm1
temp2 -> pwm2
temp3 -> pwm3
prog  -> pwm4 (not on 667HG; the programmable setting is not supported by
               the driver)
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/sys files

name - this is a standard hwmon device entry. For the W83627EHF and W83627EHG, it is set to "w83627ehf" and for the W83627DHG it is set to "w83627dhg"

pwm[1-4] - this file stores PWM duty cycle or DC value (fan speed) in range: 0 (stop) to 255 (full)

pwm[1-4]_enable - this file controls mode of fan/temperature control:

- * 1 Manual mode, write to pwm file any value 0-255 (full speed)
- * 2 "Thermal Cruise" mode
- * 3 "Fan Speed Cruise" mode
- * 4 "Smart Fan III" mode

pwm[1-4]_mode - controls if output is PWM or DC level

- * 0 DC output (0 - 12v)
- * 1 PWM output

Thermal Cruise mode

If the temperature is in the range defined by:

pwm[1-4]_target - set target temperature, unit millidegree Celsius (range 0 - 127000)

pwm[1-4]_tolerance - tolerance, unit millidegree Celsius (range 0 - 15000)

there are no changes to fan speed. Once the temperature leaves the interval, fan speed increases (temp is higher) or decreases if lower than desired. There are defined steps and times, but not exported by the driver yet.

pwm[1-4]_min_output - minimum fan speed (range 1 - 255), when the temperature is below defined range.

pwm[1-4]_stop_time - how many milliseconds [ms] must elapse to switch

w83627ehf..txt
corresponding fan off. (when the temperature was below
defined range).

Note: last two functions are influenced by other control bits, not yet exported
by the driver, so a change might not have any effect.

Implementation Details

Future driver development should bear in mind that the following registers have
different functions on the 627EHF and the 627DHG. Some registers also have
different power-on default values, but BIOS should already be loading
appropriate defaults. Note that bank selection must be performed as is currently
done in the driver for all register addresses.

0x49: only on DHG, selects temperature source for AUX fan, CPU fan0
0x4a: not completely documented for the EHF and the DHG documentation assigns
different behavior to bits 7 and 6, including extending the temperature
input selection to SmartFan I, not just SmartFan III. Testing on the EHF
will reveal whether they are compatible or not.

0x58: Chip ID: 0xa1=EHF 0xc1=DHG
0x5e: only on DHG, has bits to enable "current mode" temperature detection and
critical temperature protection
0x45b: only on EHF, bit 3, vin4 alarm (EHF supports 10 inputs, only 9 on DHG)
0x552: only on EHF, vin4
0x558: only on EHF, vin4 high limit
0x559: only on EHF, vin4 low limit
0x6b: only on DHG, SYS fan critical temperature
0x6c: only on DHG, CPU fan0 critical temperature
0x6d: only on DHG, AUX fan critical temperature
0x6e: only on DHG, CPU fan1 critical temperature

0x50-0x55 and 0x650-0x657 are marked "Test Register" for the EHF, but "Reserved
Register" for the DHG

The DHG also supports PECI, where the DHG queries Intel CPU temperatures, and
the ICH8 southbridge gets that data via PECI from the DHG, so that the
southbridge drives the fans. And the DHG supports SST, a one-wire serial bus.

The DHG-P has an additional automatic fan speed control mode named Smart Fan
(TM) III+. This mode is not yet supported by the driver.