Kernel driver it87

Supported chips:
  * IT8705F
    Prefix: 'it87'
    Addresses scanned: from Super I/O config space (8 I/O ports)
    Datasheet: Once publicly available at the ITE website, but no longer
  * IT8712F
    Prefix: 'it8712'
    Addresses scanned: from Super I/O config space (8 I/O ports)
    Datasheet: Once publicly available at the ITE website, but no longer
  * IT8716F/IT8726F
    Prefix: 'it8716'
    Addresses scanned: from Super I/O config space (8 I/O ports)
    Datasheet: Once publicly available at the ITE website, but no longer
  * IT8718F
    Prefix: 'it8718'
    Addresses scanned: from Super I/O config space (8 I/O ports)
    Datasheet: Once publicly available at the ITE website, but no longer
  * IT8720F
    Prefix: 'it8720'
    Addresses scanned: from Super I/O config space (8 I/O ports)
    Datasheet: Not publicly available
  * SiS950   [clone of IT8705F]
    Prefix: 'it87'
    Addresses scanned: from Super I/O config space (8 I/O ports)
    Datasheet: No longer be available

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Module Parameters

* update_vbat: int

  0 if vbat should report power on value, 1 if vbat should be updated after
  each read. Default is 0. On some boards the battery voltage is provided
  by either the battery or the onboard power supply. Only the first reading
  at power on will be the actual battery voltage (which the chip does
  automatically). On other boards the battery voltage is always fed to
  the chip so can be read at any time. Excessive reading may decrease
  battery life but no information is given in the datasheet.

* fix_pwm_polarity int

  Force PWM polarity to active high (DANGEROUS). Some chips are
  misconfigured by BIOS - PWM values would be inverted. This option tries
  to fix this. Please contact your BIOS manufacturer and ask him for fix.

Hardware Interfaces

All the chips suported by this driver are LPC Super-I/O chips, accessed through the LPC bus (ISA-like I/O ports). The IT8712F additionally has an SMBus interface to the hardware monitoring functions. This driver no longer supports this interface though, as it is slower and less reliable than the ISA access, and was only available on a small number of motherboard models.

Description

This driver implements support for the IT8705F, IT8712F, IT8716F, IT8718F, IT8720F, IT8726F and SiS950 chips.

These chips are 'Super I/O chips', supporting floppy disks, infrared ports, joysticks and other miscellaneous stuff. For hardware monitoring, they include an 'environment controller' with 3 temperature sensors, 3 fan rotation speed sensors, 8 voltage sensors, and associated alarms.

The IT8712F and IT8716F additionally feature VID inputs, used to report the Vcore voltage of the processor. The early IT8712F have 5 VID pins, the IT8716F and late IT8712F have 6. They are shared with other functions though, so the functionality may not be available on a given system.

The IT8718F and IT8720F also features VID inputs (up to 8 pins) but the value is stored in the Super-I/O configuration space. Due to technical limitations, this value can currently only be read once at initialization time, so the driver won't notice and report changes in the VID value. The two upper VID bits share their pins with voltage inputs (in5 and in6) so you can't have both on a given board.

The IT8716F, IT8718F, IT8720F and later IT8712F revisions have support for 2 additional fans. The additional fans are supported by the driver.

The IT8716F, IT8718F and IT8720F, and late IT8712F and IT8705F also have optional 16-bit tachometer counters for fans 1 to 3. This is better (no more fan clock divider mess) but not compatible with the older chips and revisions. The 16-bit tachometer mode is enabled by the driver when one of the above chips is detected.

The IT8726F is just bit enhanced IT8716F with additional hardware for AMD power sequencing. Therefore the chip will appear as IT8716F to userspace applications.

Temperatures are measured in degrees Celsius. An alarm is triggered once when the Overtemperature Shutdown limit is crossed.

Fan rotation speeds are reported in RPM (rotations per minute). An alarm is triggered if the rotation speed has dropped below a programmable limit. When 16-bit tachometer counters aren't used, fan readings can be divided by a programmable divider (1, 2, 4 or 8) to give the readings more range or accuracy. With a divider of 2, the lowest representable value is around 2600 RPM. Not all RPM values can accurately be represented, so some rounding is done.

Voltage sensors (also known as IN sensors) report their values in volts. An alarm is triggered if the voltage has crossed a programmable minimum or maximum limit. Note that minimum in this case always means 'closest to zero'; this is important for negative voltage measurements. All voltage inputs can measure voltages between 0 and 4.08 volts, with a resolution of 0.016 volt. The battery voltage in8 does not have limit registers.

The VID lines (IT8712F/IT8716F/IT8718F/IT8720F) encode the core voltage value: the voltage level your processor should work with. This is hardcoded by the mainboard and/or processor itself. It is a value in volts.

If an alarm triggers, it will remain triggered until the hardware register is read at least once. This means that the cause for the alarm may already have disappeared! Note that in the current implementation, all hardware registers are read whenever any data is read (unless it is less than 1.5 seconds since the last update). This means that you can easily miss once-only alarms.

Out-of-limit readings can also result in beeping, if the chip is properly wired and configured. Beeping can be enabled or disabled per sensor type (temperatures, voltages and fans.)

The IT87xx only updates its values each 1.5 seconds; reading it more often will do no harm, but will return 'old' values.

To change sensor N to a thermistor, 'echo 4 > tempN_type' where N is 1, 2, or 3. To change sensor N to a thermal diode, 'echo 3 > tempN_type'. Give 0 for unused sensor. Any other value is invalid. To configure this at startup, consult lm_sensors's /etc/sensors.conf. (4 = thermistor; 3 = thermal diode)

Fan speed control

The fan speed control features are limited to manual PWM mode. Automatic "Smart Guardian" mode control handling is only implemented for older chips (see below.) However if you want to go for "manual mode" just write 1 to pwmN_enable.

If you are only able to control the fan speed with very small PWM values, try lowering the PWM base frequency (pwm1_freq). Depending on the fan, it may give you a somewhat greater control range. The same frequency is used to drive all fan outputs, which is why pwm2_freq and pwm3_freq are read-only.

Automatic fan speed control (old interface)

The driver supports the old interface to automatic fan speed control which is implemented by IT8705F chips up to revision F and IT8712F chips up to revision G.

This interface implements 4 temperature vs. PWM output trip points. The PWM output of trip point 4 is always the maximum value (fan running

at full speed) while the PWM output of the other 3 trip points can be freely chosen. The temperature of all 4 trip points can be freely chosen. Additionally, trip point 1 has an hysteresis temperature attached, to prevent fast switching between fan on and off.

The chip automatically computes the PWM output value based on the input temperature, based on this simple rule: if the temperature value is between trip point N and trip point N+1 then the PWM output value is the one of trip point N. The automatic control mode is less flexible than the manual control mode, but it reacts faster, is more robust and doesn't use CPU cycles.

Trip points must be set properly before switching to automatic fan speed control mode. The driver will perform basic integrity checks before actually switching to automatic control mode.