F75375S/F75375SG

Fintek Hardware Monitor IC Datasheet

Release Date: July 2007
Revision: Version 0.26P

F75375 Datasheet Revision History

Version	Date	Page	Revision History
0.20P	2002 May.		Original version
0.21P	2003 Dec		1. Add external clock input function. 2. Add Linear mode for fan speed control
0.22P	2004 Jan	3	Revise pin13 description
0.23P	2004 Feb	15 45 - 46	1.Revise register description of Index01 2.Revise AC/DC characteristics
0.24P	2004 Sep	2	Add key spec.(supply voltage and operating supply current)
0.25P	2005 Apr	23	Support Green package F75375SG and delete version ID register
0.26P	2007 July		Company readdress

LIFE SUPPORT APPLICATIONS

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1 General Description

F75375S is a system hardware monitoring and automatic fan speed controlling IC specific designed for graphic cards and mini PC etc. The F75375S can monitor several critical hardware parameters of the system, including voltages, temperatures and fan speeds which are very important for the system to work stably and properly.

An 8-bit analog-to-digital converter (ADC) was built inside F75375S. The chip can monitor up to 4 analog voltage inputs, 2 fan tachometer inputs and 2 remote temperature sensors. The remote temperature sensor is suggested to be performed by thermistor, transistor 2N3906 and CPU thermal diode. The F75375S can provide automatic fan speed control so that the system can operate at the minimum acoustic noise. This chip support not only PWM duty mode but also linear mode for fan speed control. Internal oscillator was built in this chip and user can use external clock input if users need accurate fan speed count. Also the users can set up the upper and lower limits (alarm thresholds) of all monitored parameters and this chip can also issue warning messages for system protection when there is something wrong with monitored items.

Through the BIOS or application software, the users can read all the monitored parameters of system all the time. And a pop-up warning can be also activated when the monitored item was out of the proper/pre-setting range. The application software could be Fintek's application software MyGuard™ or other management application software. The F75375S is in the package of 150mil 16-pin SOP and powered by 3.3V.

2 Feature

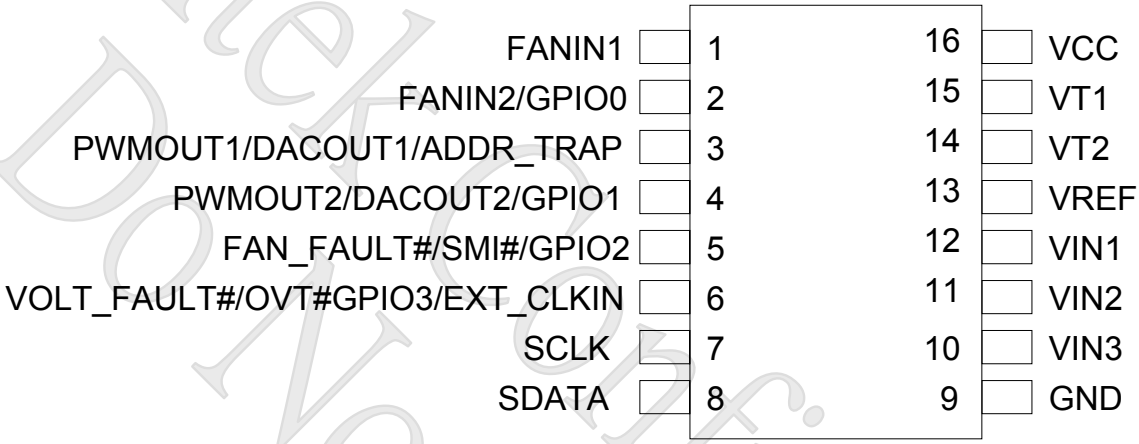
- 4 voltage inputs
- Monitor up to 2 remote temperature sensor
  -- from remote thermistor / transistor / thermal diode (BJT diode-connected)
- Up to 2 fan speed monitoring input and 2 automatic fan speed control
  -- Support both linear and PWM fan speed control (PWMOUT 25KHz support 4 pin fan)
  -- 3 flexible fan speed controlled modes : Manual mode, Speed mode and Temperature mode.
- Programmable limited and setting points(alert threshold) for all monitored items
- Issue FAN_FAULT# or VOLT_FAULT# or OVT# or SMI# signal to activate system protection
- Can use external clock for accurate fan speed count
- Up to 4 general purpose I/O support
- 2-wire I^2C interface
- V_{CC}3V operation and 16SOP package(150mil)

Noted: Patented TW207103 TW207104 TW220442 US6788131 B1

3 Key Specifications

- Supply voltage 3.0~3.6V
- Operating supply current 3 mA typ.

4 Pin Configuration



5 Pin Description

O_8 - TTL level output pin with 8 mA source-sink capability

IN_{ts}/OD_{12} - TTL level bi-directional pin, can select to O.D or OUT by register, with 12mA source-sink capability

I/OD_8 - TTL level bi-directional pin, Open-drain outpu with 8 mA sink capability

I/OD_{16} - TTL level bi-directional pin, Open-drain outpu with 16 mA sink capability

AOUT - Output pin(Analog)

OD_{16} - Open-drain output pin with 16 mA sink capability

IN_t - TTL level input pin

IN_{ts} - TTL level input pin and schmitt trigger

$IN_{tsd100k}$ - TTL level input pin and schmitt trigger with internal pull down 100K ohm

AIN - Input pin(Analog)

P - Power

◆ Power Pin

Pin No.	Pin Name	Type	Description
16	VCC	P	3.3V power supply voltage input
9	GND	P	GND

◆ Monitoring Items and Fan Speed Control

Pin No.	Pin Name	Type	Description
1	FANIN1	IN_t	0V to +3.3V amplitude fan tachometer input.
2	GPIO0	IN_{ts}/OD_8	(Default) General purpose I/O pin. Default Open drain
	FANIN2	IN_t	0V to +3.3V amplitude fan tachometer input.
3	PWMOUT1	O_{12}	Fan speed control pin. This pin is either PWM-duty mode or Linear mode.
	DACOUT1	AOUT	
	ADDR_TRAP	$IN_{tsd100k}$	Address power on trapping pin. Internal pull down100k ohm. The internal pull-down resistor will be turn-off after power-on trapping.
4	GPIO1	IN_{ts}/OD_{12}	(Default) General purpose I/O pin. Default Open drain
	PWMOUT2	O_{12}	Fan speed control pin. This pin is either PWM-duty mode or Linear mode.
	DACOUT2	AOUT	
10	VIN3	AIN	0V to 2.048V FSR Analog Inputs
11	VIN2	AIN	0V to 2.048V FSR Analog Inputs
12	VIN1	AIN	0V to 2.048V FSR Analog Inputs
14	VT2	AIN	Thermistor / transistor / thermal diode terminal input
15	VT1	AIN	Thermistor / transistor / thermal diode terminal input

◆ Alert Signals and Others

Pin No.	Pin Name	Type	Description
5	GPIO2	IN_{ts}/OD_{14}	(Default) General purpose I/O function. Default pure open drain
	SMI#	OD_{14}	System management interrupt (Pure Open Drain)
	FAN_FAULT#	OD_{14}	This pin will be a logic **LOW** when the fan speed is abnormal.
6	GPIO3	IN_{ts}/OD_8	(Default) General purpose I/O function. Default Open drain
	OVT#	OD_8	Active-Low output. This pin will be a logic **LOW** when the temperature exceeds its limit.
	VOLT_FAULT#	OD_8	Active-Low output. This pin will be a logic **LOW** when the voltage exceeds its limit.
	EXT_CLKIN	IN_t	48MHz External clock input for chip operation source.

13	VREF	AOUT	Reference Voltage.

◆ **Serial Bus Control Pin**

Pin No.	Pin Name	Type	Description
8	SDATA	IN_{ts}/OD_{12}	Serial Bus data.
7	SCLK	IN_{ts}	Serial Bus clock.

6 Functional Description

F75375S is a system hardware monitoring and automatic fan speed controlling IC specific designed for graphic cards. The chip can monitor up to 4 analog voltage inputs, 2 fan tachometer inputs and 2 remote temperature sensors. The remote temperature sensor can be performed by thermistor, transistor and thermal diode. The F75375S can provide automatic fan speed control so that the system can operate at the minimum acoustic noise. Also the users can set up the upper and lower limits (alarm thresholds) of all monitored parameters and this chip can also issue warning messages for system protection when there is something wrong with monitored items.

6.1 Analog Input

For the 8-bit ADC has the 7.8125mv LSB, the maximum input voltage of the analog pin is 2V. Therefore the voltage under 2V (ex:1.5V) can directly connected to these analog inputs. The voltage higher than 2V should be reduced by a factor with external resistors so as to obtain the input range. Only 3VCC is an exception for it is main power of the F75375S. Therefore 3VCC can directly connect to this chip and need no external resistors. There are two functions in this pin with 3.3V. The first function is to supply internal analog power of the F75375S and the second function is that this voltage with 3.3V is connected to internal serial resistors to monitor the +3.3V voltage. The internal serial resistors are two 50K ohm, so that the internal reduced voltage is half +3.3V.

There are four voltage inputs in the F75375S and the voltage divided formula is shown as follows:

$$VIN = V_{+12V} \times \frac{R_2}{R_1 + R_2}$$

where V_{+12V} is the analog input voltage, for example.

If we choose R1=27K, R2=5.1K, the exact input voltage for V_{+12v} will be 1.907V, which is within the tolerance.
As for application circuit, it can be refer to the figure shown as follows.