# F75373S/F75373SG

## Fintek Hardware Monitor IC Datasheet

**Release Date: July 2007**
**Revision: Version 0.25P**

## F75373 Datasheet Revision History

| Version | Date | Page | Revision History |
|---|---|---|---|
| 0.20P | 2003 Apr. | | Original version |
| 0.21P | 2003 July | 9~10 | Update fan speed control mechanism description |
| 0.22P | 2003 Dec | | Add DC spec. in the datasheet |
| 0.23P | 2004 July | | Revise application circuit |
| 0.24P | 2005 July | | Add part no. F75373SG(Green package) and delete version ID |
| 0.25P | 2007 July | | Company readdress |



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# Table of Contents

# 1 General Description

F75373S is a system hardware monitoring and automatic fan speed controlling IC specific designed for graphic cards etc.. F75373S 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 F75373S. 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. The F75373S 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.

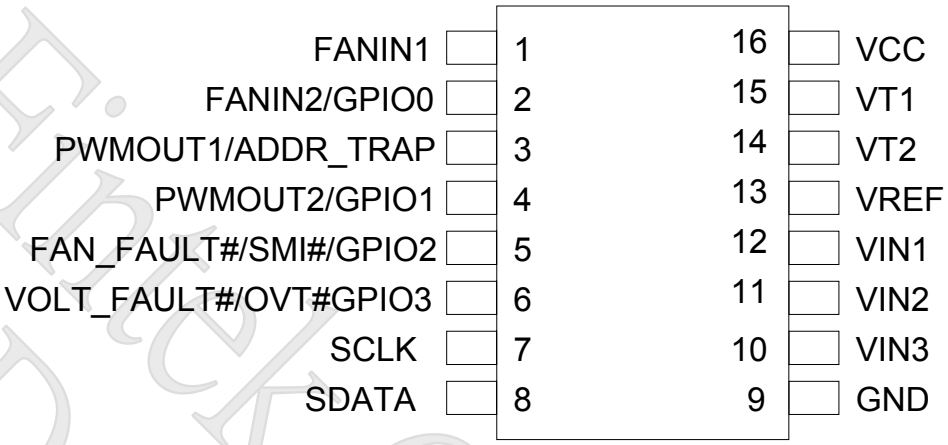
Through the BIOS or application software, the users can read all the monitored parameters of system all the time. And a pop-up warning can be also activated when the monitored item was out of the proper/pre-setting range. The application software could be Fintek's application software MyGuard™, or Intel™ LDCM (LanDesk Client Management), or other management application software. The F75373S is in the package of 150mil 16-pin SOP and powered by 3.3V.

# 2 Feature

- 4 voltage inputs
  -- typical for Vcore, $V_{DDQ}$, and $V_{CC}$3V etc
- Monitor up to 2 remote temperature sensor from remote thermistor
- Up to 2 fan speed monitoring input and 2 automatic fan speed control
  -- 3 flexible fan control mode: 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
- Up to 4 general purpose I/O support
- 2-wire SMBus interface
- $V_{CC}$3V operation and 16SOP package(150mil)

Noted: Patented TW207103 TW207104 TW220442 US6788131 B1

# 3 Pin Configuration






# 4 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. |
| | ADDR_TRAP | $IN_{tsd100k}$ | Address power on trapping pin. Internal pull down100k ohm |
| 4 | GPIO1 | $IN_{ts}/OD_{12}$ | (Default) General purpose I/O pin. Default Open drain |
| | PWMOUT2 | $O_{12}$ | Fan speed control pin. |
| 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 2 terminal input |
| 15 | VT1 | AIN | Thermistor 1 terminal input. |

## ◆ Alert Signals and Others

| Pin No. | Pin Name | Type | Description |
|---|---|---|---|
| 5 | GPIO2 | $IN_{ts}/OD_{16}$ | (Default) General purpose I/O function. Default pure open drain |
| | SMI# | $OD_{16}$ | System management interrupt (Pure Open Drain) |
| | FAN_FAULT# | $OD_{16}$ | 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. |
| 13 | VREF | AOUT | Reference Voltage. 2.304v |

## ◆ 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. |

# 5 Functional Description

F75373S 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 is suggested to be performed by thermistor. The F75373S 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.

## 5.1 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 F75373S. 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 F75373S 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 F75373S and the voltage divided formula is shown as follows:

$$VIN = V_{+3.3V} \times \frac{R_2}{R_1 + R_2}$$

where $V_{+3.3V}$ is the analog input voltage, for example.

If we choose R1=2K, R2=1K, the exact input voltage for $V_{+3.3V}$ will be 1.1V, which is within the tolerance.
As for application circuit, it can be refer to the figure shown as follows.

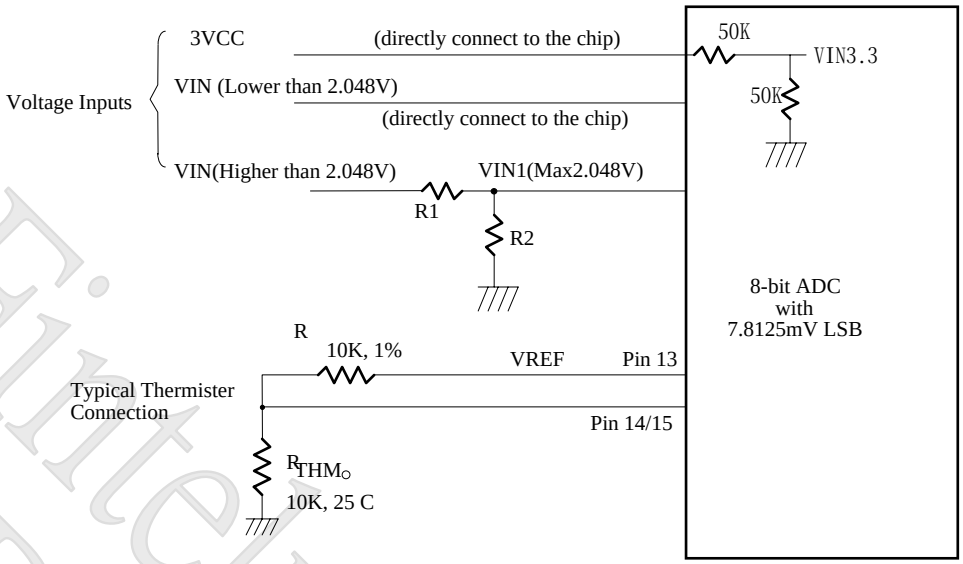



Figure 5-3

## 5.2 Access Interface

The F75373S provides one serial access interface, Serial Bus, to read/write internal registers. The address of Serial Bus is configurable by using power-on trapping. The pin 3 (PWMOUT1/ADDR_TRAP) is multi-function pin. During power-on, this pin serves as input detection of logic high or logic low. This pin is default pull-down resistor with 100K ohms mapping the Serial Bus address 0x5A (0101_1010). Another Serial Bus address 0x5C (0101_1100) is set when external pull-up resistor with 10K ohms is connected in this pin.

(a) ***Serial bus write to internal address register followed by the data byte***

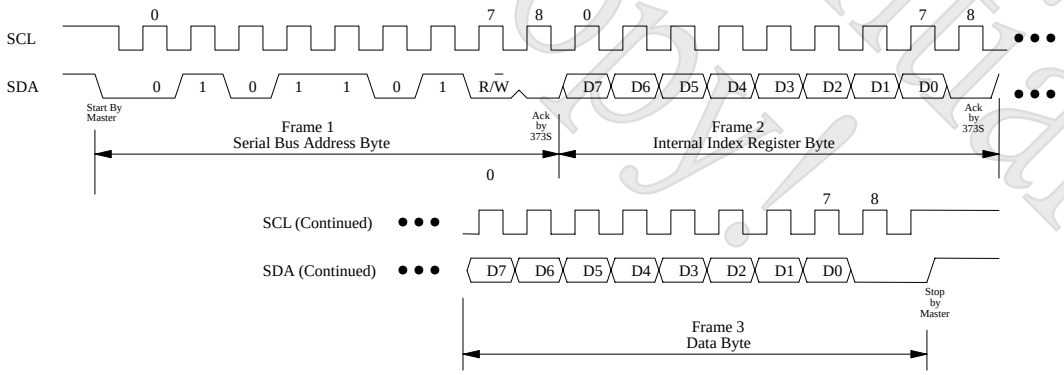



Figure 1. Serial Bus Write to Internal Address Register followed by the Data Byte

***(b) Serial bus read form internal address register followed by the data byte***

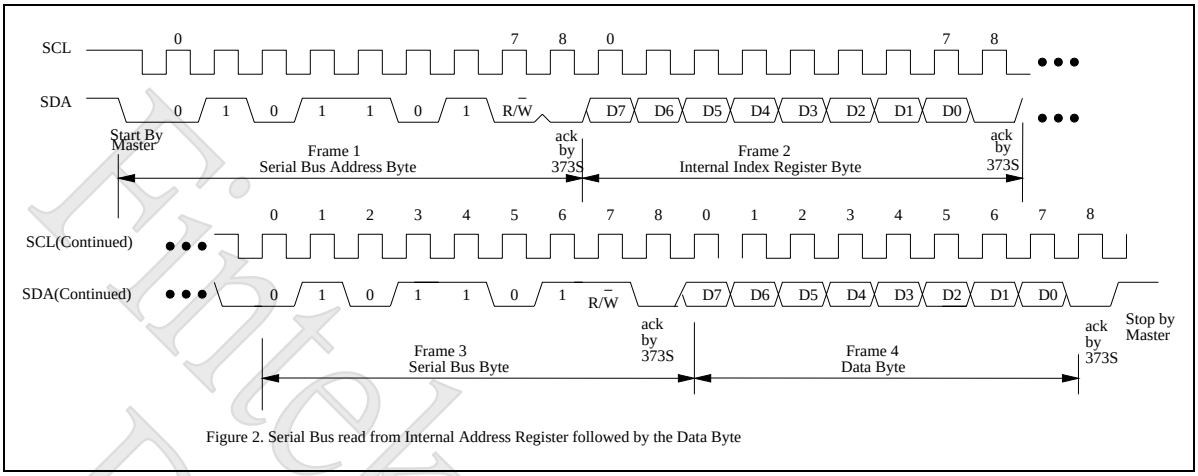



Figure 2. Serial Bus read from Internal Address Register followed by the Data Byte

## 5.3 Temperature Measurement Machine

The temperature data format is 8-bit two-complement for thermal sensor. The 8-bit temperature data can be obtained by reading through register. The format of the temperature data is show in Table 4-1.

| Temperature | 8-Bit Digital Output | |
|---|---|---|
| | 8-Bit Binary | 8-Bit Hex |
| +125°C | 0111,1101 | 7Dh |
| +25°C | 0001,1001 | 19h |
| +2°C | 0000,0010 | 02h |
| +1°C | 0000,0001 | 01h |
| +0°C | 0000,0000 | 00h |
| -1°C | 1111,1111 | FFh |
| -2°C | 1111,1110 | FEh |
| -25°C | 1110,0111 | E7h |
| -50°C | 1100,1110 | CEh |

**Table 4-1.**

### 5.3.1 Monitor Temperature from thermistor

The F75373S can connect two thermistors to measure environment temperature or remote temperature. The specification of thermistor should be considered to (1) β value is 3435K (2) resistor value is 10K ohm at 25°C. In the Figure 4-3, the themistor is

connected by a serial resistor with 10K Ohm, then connect to VREF (pin13).

### 5.3.2 Over Temperature Signal (OVT#)

The F75373S can provide two external thermal sensors to detect temperature. When monitored temperature exceeds the over-temperature threshold value, OVT# will be asserted until the temperature goes below the hysteresis temperature.

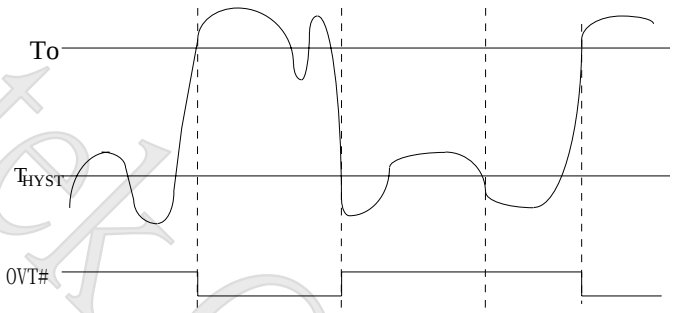



Figure 5-4

## 5.4 Fan

### 5.4.1 Fan speed count

Inputs are provided by the signals from fans equipped with tachometer outputs. The level of these signals should be set to TTL level, and maximum input voltage cannot be over VCC. If the input signals from the tachometer outputs are over the VCC, the external trimming circuit should be added to reduce the voltage to obtain the input specification. The normal circuit and trimming circuits are shown as follows:

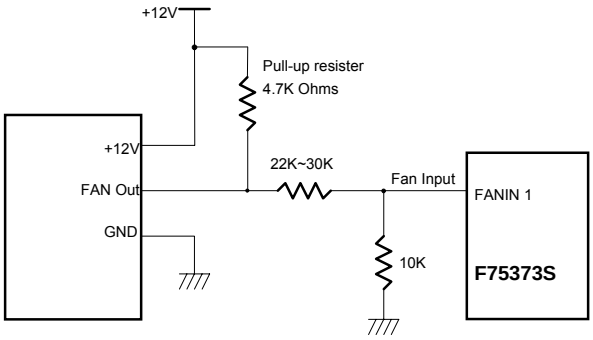



Figure 5-5 Fan with Tach Pull-Up to +12V, or Totern-Pole Output and Register Attenuator

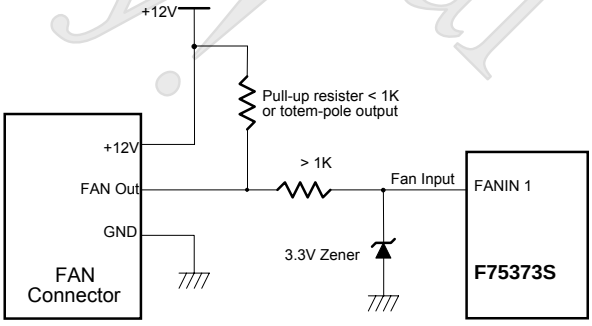



Figure 5-6 Fan with Tach Pull-Up to +12V, or Totem-Pole Putput and Zener Clamp

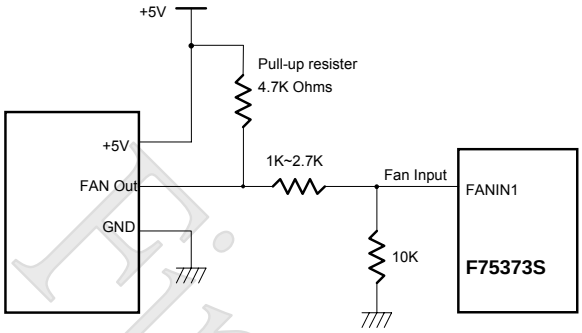
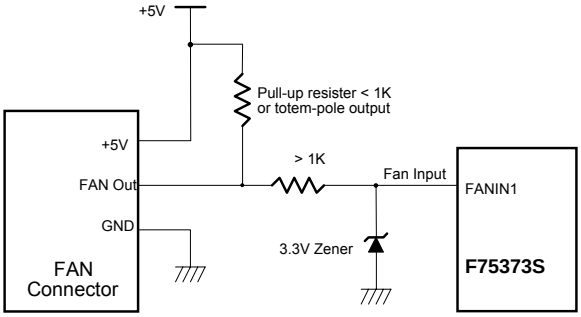



Figure 5-7. Fan with Tach Pull-Up to +5V, or Totern-Pole Output and Register Attenuator




.Figure 5-8 Fan with Tach Pull-Up to +5V, or Totem-Pole Putput and Zener Clamp

Determine the fan counter according to:

$$Count = \frac{1.5 \times 10^6}{RPM}$$

In other words, the fan speed counter has been read from register, the fan speed can be evaluated by the following equation. As for fan, it would be best to use 2 pulses tachmeter output per round.

$$RPM = \frac{1.5 \times 10^6}{Count}$$

### 5.4.2 Fan speed control

The F75373S provides 2 fan PWM speed control. The duty cycle of PWM can be programmed by a 8-bit register which are defined in the CR76h and CR86h. The default duty cycle is set to 100%, that is, the default 8-bit registers is set to FFh. The expression of duty can be represented as follows.

$$\text{Duty\_cycle}(\%) = \frac{\text{Programmed 8 - bit Register Value}}{255} \times 100\%$$

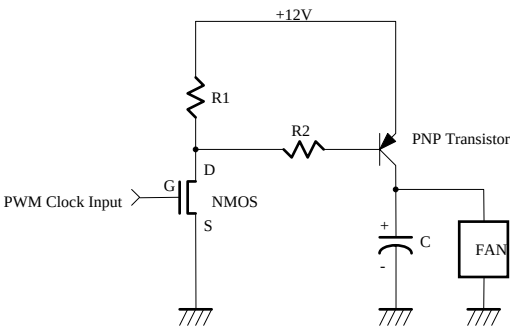



Figure 5-9

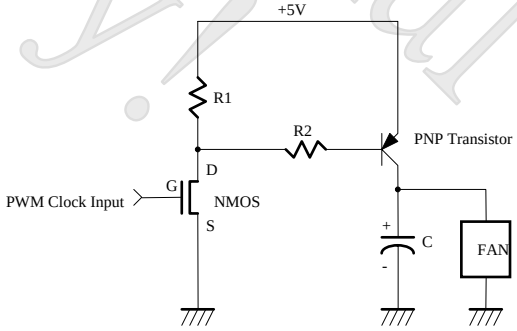



Figure 5-10

### 5.4.3 Fan speed control mechanism

There are 3 modes to control fan speed and they are manual, fan speed mode and temperature mode. For manual mode, it generally acts as PWM fan speed control. As for speed mode and temperature mode, they are more intelligent fan speed control and described as below:

#### 5.4.3.1 Fan Speed mode

Fan speed mode is an intelligent method according to expected fan speed pre-setting by BIOS. In the beginning, fan speed will operate at full speed and the F75373S will get the full speed count value. Then fan speed slows down to rotate at about 72.5% (8/11) of full speed. After that, the fan speed will automatically rotate according to the expected fan speed setting by BIOS. The register CR74h and CR75h are used for this mode.

#### 5.4.3.2 Temperature mode

At this mode, F75373S provides the clever system to automatically control fan speed related to temperature of GPU or the system. The F75373S can provide four temperature boundaries and five intervals, and each interval has its related fan speed count. All these values should be set by BIOS first. Take figure 5-11 as example. When temperature setting value is 45,55,65, and 75°C. There are five intervals and each interval is 10°C. The related desired fan speed counts for each interval are 0500h, 0400h, 0300h, 0200h, 0100h. When the temperature is within 55~65°C, the fan speed count 300h will be load into FAN EXPECT COUNTregisters(CR74h~CR75h, CR84h~CR85h). Then, F75373S will adjust PWMOUT duty-cycle to make fan speed match the expected value. It can be said that the fan will be turned on with a specific speed set by BIOS and automatically controlled with the temperature varying. The F75373S will take charge of all the fan speed control and need no software support.

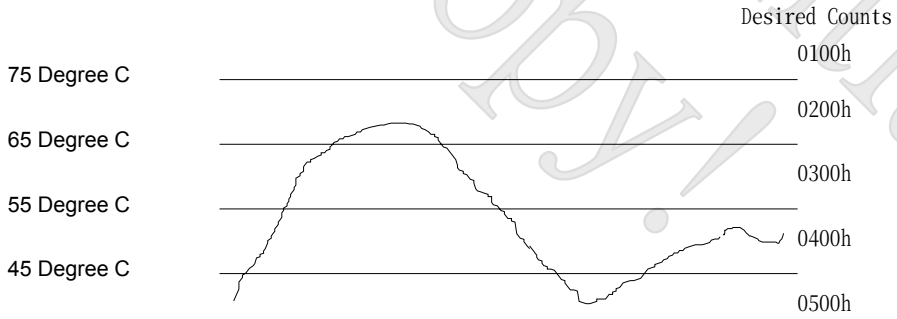



Figure 5-11

#### 5.4.3.3 PWMOUT Duty-cycle operating process

In both “FAN SPEED” and “TEMPERATURE” modes, F75373S adjust PWMOUT duty-cycle according to current fan count and expected fan count. It will operate as follows:

(1). When expected count is FFFFh, PWMOUT duty-cycle will be set to 00h to turn off fan.

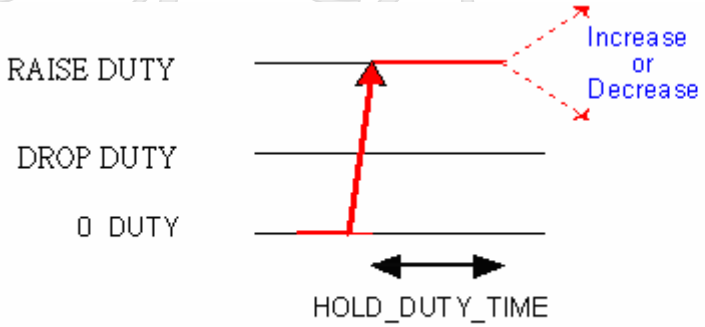
(2). When expected count is 0000h, PWMOUT duty-cycle will be set to FFh to turn on fan with full speed.

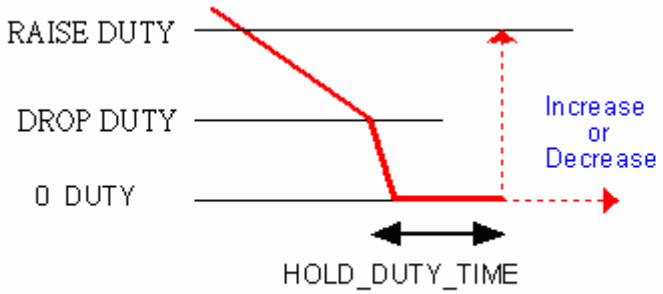
(3). If both (1) and (2) are not true and KEEP_DROP_DUTY(see INDEX 60h) is set to 0,

(a). When PWMOUT duty-cycle decrease to DROP_DUTY(≠ 00h), obviously the duty-cycle will be 00h next, F75373S will keep duty-cycle at 00h 3 seconds[1]. After that, F75373S starts to compare current fan count and expected count in order to increase or decrease its duty-cycle. This ensures that if there is any glitch during the 3 seconds[1] period, F75373S will ignore it.

(b). When PWMOUT duty-cycle increase from 00h to RAISE_DUTY(≠ 00h), F75373S also will keep duty-cycle at RAISE-DUTY 3 seconds[1]. After that, F75373S starts to compare current fan count and expected count in order to increase or decrease its duty-cycle. This ensures that if there is any glitch during the 3 seconds[1] period, F75373S will ignore it.

Note 1: The period can be programmed at INDEX 6Eh.



#### 5.4.4 FAN_Fault#

Fan_Fault will be aserted when the fan speed doesn't meet the expected fan speed within a programmable period(default is 3 minutes) . There are two conditions may cause the FAN_FAULT#.

(1). When PWM_Duty reaches FFh, the fan speed count can't reach the fan expected count in time. (Figure 5-12)

(2). When PWM_Duty reaches 00h, if the fan speed count can't reach the fan expected count in time.(Figure 5-13)

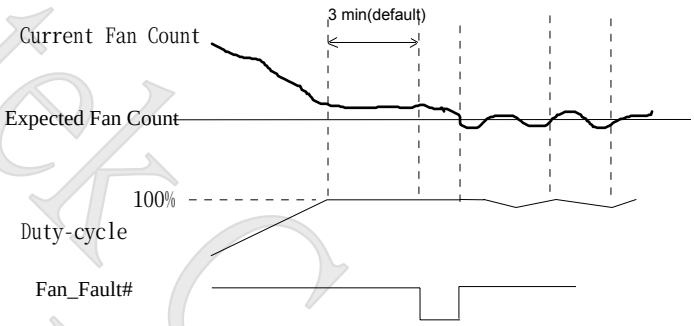



Figure 5-12

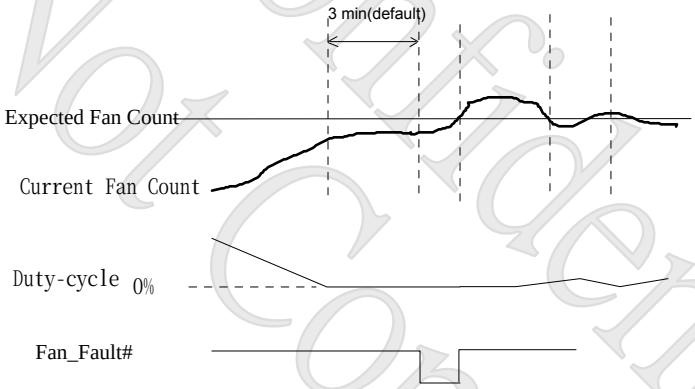
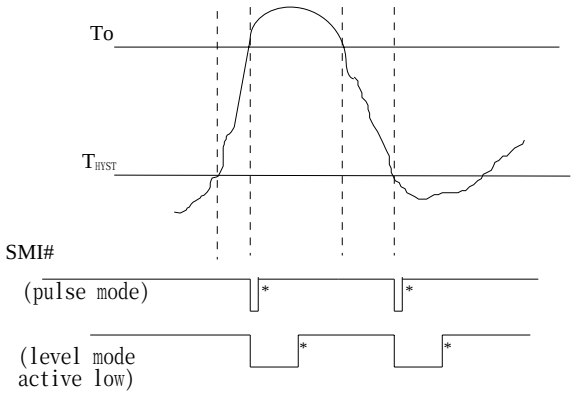



Figure 5-13

## 5.5 SMI#

#### 5.5.1 Temperature

SMI# interrupt for temperature is shown as figure 5-13. Temperature exceeding high limit or going below hystersis will cause an interrupt if the previous interrupt has been reset by writing "1" all the interrupt Status Register.




*Interrupt Reset when Interrupt Status Registers are written 1

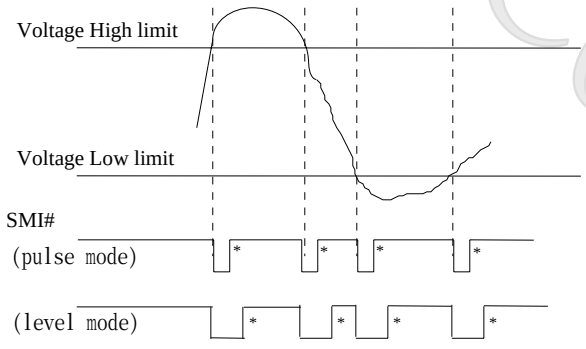
Figure 5-13

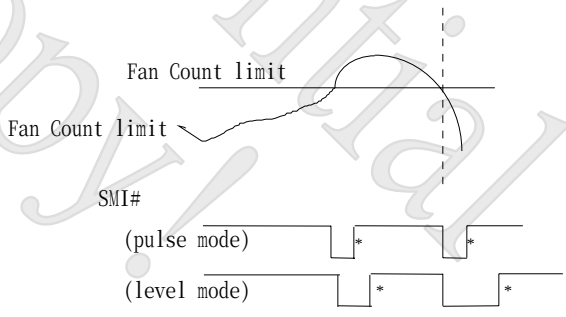
### 5.5.2 Voltage

SMI# interrupt for voltage is shown as figure 5-14. Voltage exceeding or going below high limit will cause an interrupt if the previous interrupt has been reset by writing "1" all the interrupt Status Register. Voltage exceeding or going below low limit will result in the same condition as voltage exceeding or going below high limit.

### 5.5.3 Fan

SMI# interrupt for fan is shown as figure 5-15 . SMI# will be asserted when the fan speed count exceeds or goes below the fan limit (Value RAM 2Ch~2Dh, 2Eh~2Fh).




*Interrupt Reset when Interrupt Status Registers are written 1

Voltage SMI# Mode

Figure 5-14

FAN SMI# Mode

Figure 5-15

### 5.6 VOLT_FAULT# (Voltage Fault Signal)

When voltage leaps from the security range setting by BIOS, the warning signal VOLT_FAULT# will be activated. Shown in figure 5-16

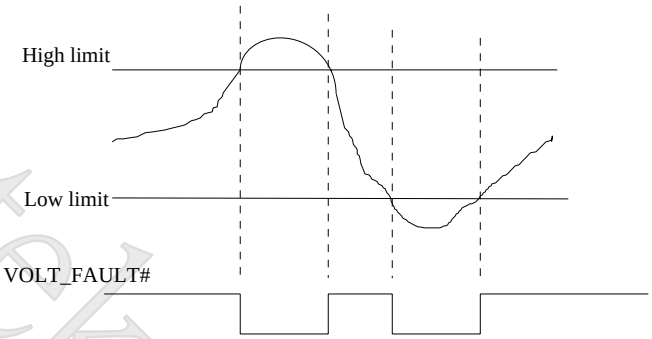



Figure 5-16

# 6 Register Description

## 6.1 Configuration Register — Index 00h

Power on default <7:0> = 01h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7 | INIT | R/W | Set one restores power on default value to all registers except the Serial Bus Address register. This bit clears itself since the power on default is zero. |
| 6 | SOFT_PWDN | R/W | Set this bit to 1 will power down A/D converter circuit. Default is 0 |
| 5-1 | Reserved | RO | Read back will be 0 |
| 0 | START | R/W | A one enables startup of monitoring operations; a zero puts the part in standby mode. |

## 6.2 Configuration Register — Index 01h

Power on default <7:0> = 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-2 | Reserved | RO | Read back will be 0 |
| 1 | PIN4_MODE | R/W | Pin 4 mode select, set this bit to 1 will enable PWMOUT2 output, else if set this bit to 0, pin 4 will be enable the GPIO1 function.(default)<br>This mode is trappable: When PIN3 trapped to high at power-on, PIN4 is set to PWMOUT2. When PIN3 trapped to low at power-on, PIN4 is set to GPIO1. |
| 0 | PIN2_MODE | R/W | Pin 2 mode select, set this bit to 1 will enable FANIN2 input, if set this bit to 0 pin 2 will be enable the GPIO0 function.(default).<br>This mode is trappable: When PIN3 trapped to high at power-on, PIN2 is set to FANIN2. When PIN3 trapped to low at power-on, PIN2 is set to GPIO0. |

## 6.3 Configuration Register — Index 02h

Power on default <7:0> = 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-6 | PIN5_MODE | R/W | 00: pin5 function is GPIO2<br>01: pin5 is used as SMI<br>10: pin5 is used as Fan fault function<br>11: LED out(1Hz/0.5Hz select by bit2) |
| 5 | SMI_MODE | R/W | If set to 0, SMI will be level mode else if this bit set to 1, SMI will be pulse mode. |
| 4 | SMI_LEVEL | R/W | When set this bit to 0 SMI is low active (default). if set to 1 SMI is high active |
| 3 | Reserved | R/W | Reserved register |
| 2 | LED_FREQ | R/W | When set this bit to 1 fan fault LED output frequency will be 0.5HZ, else is 1Hz(default) |
| 1 | F_FAULT_MODE | R/W | When set this bit to 0 the fan fault will be level mod, else if set to 1 the fan fault will indicate by LED function(1Hz or 0.5Hz) the LED frequency can set by REG02H bit2 |

| | | | |
|---|---|---|---|
| 0 | F_FAULT_LEVEL | R/W | When set this bit to 0 fan fault is low active (default). if set to 1 fan fault is high active |

## 6.4 Configuration Register — Index 03h

Power on default <7:0> = 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7 | PIN6_MODE | R/W | 00: pin6 function is GPIO3<br>01: pin6 is used as OVT<br>10: pin6 is used as Voltage fault function<br>11: Reserved |
| 5 | OVT_LEVEL | R/W | When set this bit to 0 OVT is low active (default), else if set to 1 OVT is high active |
| 3-4 | OVT_QUEUE | R/W | OVT queue is use to filter the temperature noise, it define the times of the event when OVT is asserted.<br>00: 1 times<br>01: 3 times<br>10: 5 times<br>11: 7 times |
| 2 | V_FAULT_LEVEL | R/W | Voltage fault level. When set this bit to 0 voltage fault is low active (default). if set to 1 fan fault is high active |
| 1-0 | V_FAULT_QUEUE | R/W | Voltage fault queue. It is used to filter the voltage noise, the follow define the times of the event when VOLT_FAULT is asserted.<br>00: 1 times<br>01: 3 times<br>10: 5 times<br>11: 7 times |

## 6.5 Serial Bus Address Register — Index 04h

Power on default: 5Ah or 5Ch.

| Bit | Name | Attribute | Description |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 7-0 | SERIAL_ADDR | RO | Serial Bus address. Power on default value depends on the status of pin3(PWMOUT1/ADDR_TRAP) at the moment of power on. If the pin status is 1, the value is 5Ch, otherwise is 5Ah.<br>To read or write registers of this chip, the serial address must match this value.<br>This register can be written by a sequence value to this register : A9h, C3h, XXh, in which XXh will be the value being written to this register; this is to protect the register from being written by accident. |

## 6.6 Value RAM — Index 10h- 2Fh

| Address 10-3F | Attribute | Description |
|---|---|---|
| 10h | RO | VCC reading. The unit of reading is 7.8125mV. |
| 11h | RO | V1 reading. The unit of reading is 7.8125mV. |
| 12h | RO | V2 reading. The unit of reading is 7.8125mV. |
| 13h | RO | V3 reading. The unit of reading is 7.8125mV. |
| 14h | RO | Temperature 1 reading. The unit of reading is 1°C. |
| 15h | RO | Temperature 2 reading. The unit of reading is 1°C. |
| 16h | RO | FAN1 count reading (MSB) |
| 17h | RO | FAN1 count reading (LSB) |
| 18h | RO | FAN2 count reading (MSB) |
| 19h | RO | FAN2 count reading (LSB) |
| 1Ah~1Eh | | Reserved |
| 20h | R/W | VCC High Limit. The unit is 7.8125mV. |
| 21h | R/W | VCC Low Limit. The unit is 7.8125mV. |
| 22h | R/W | V1 High Limit. The unit is 7.8125mV. |
| 23h | R/W | V1 Low Limit. The unit is 7.8125mV. |
| 24h | R/W | V2 High Limit. The unit is 7.8125mV. |
| 25h | R/W | V2 Low Limit. The unit is 7.8125mV. |
| 26h | R/W | V3 High Limit. The unit is 7.8125mV. |
| 27h | R/W | V3 Low Limit. The unit is 7.8125mV. |
| 28h | R/W | Temperature sensor 1 High Limit. The unit is 1°C. |
| 29h | R/W | Temperature sensor 1 Hysteresis Limit. The unit is 1°C. |
| 2A h | R/W | Temperature sensor 2 High Limit. The unit is 1°C. |

| | | |
|---|---|---|
| 2Bh | R/W | Temperature sensor 2 Hysteresis Limit. The unit is 1°C. |
| 2Ch | R/W | FAN1 Fan Count Limit<br>**Note:** It is the number of counts of the internal clock for the Low Limit of the fan speed. |
| 2Dh | R/W | FAN1 Fan Count Limit<br>**Note:** It is the number of counts of the internal clock for the Low Limit of the fan speed. |
| 2Eh | R/W | FAN2 Fan Count Limit<br>**Note:** It is the number of counts of the internal clock for the Low Limit of the fan speed. |
| 2Fh | R/W | FAN2 Fan Count Limit<br>**Note:** It is the number of counts of the internal clock for the Low Limit of the fan speed. |

Setting all ones to the high limits for voltages and fans (0111 1111 binary for temperature) means interrupts will never be generated except the case when voltages go below the low limits.

### 6.7 IRQ/SMI# ENABLE Register 1 — Index 30h

Power on default: 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7 | EN_FAN2_SMI | R/W | A one enables the corresponding interrupt status bit for SMI# interrupt |
| 6 | EN_FAN1_SMI | R/W | A one enables the corresponding interrupt status bit for SMI# interrupt. |
| 5 | EN_VT2_SMI | R/W | A one enables the corresponding interrupt status bit for SMI# interrupt. |
| 4 | EN_VT1_SMI | R/W | A one enables the corresponding interrupt status bit for SMI# interrupt. |
| 3 | EN_V3_SMI | R/W | A one enables the corresponding interrupt status bit for SMI# interrupt. |
| 2 | EN_V2_SMI | R/W | A one enables the corresponding interrupt status bit for SMI# interrupt. |
| 1 | EN_V1_SMI | R/W | A one enables the corresponding interrupt status bit for SMI# interrupt. |
| 0 | EN_VCC_SMI | R/W | A one enables the corresponding interrupt status bit for SMI# |

| | | | |
|---|---|---|---|
| | | | interrupt. |

## 6.8 Interrupt Status Register 1 — Index 31h

Power on default: 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7 | FAN2_STS | R/W | A one indicates fan2 count limit has been exceeded. Write 1 to clear this bit, write 0 will be ignored. |
| 6 | FAN1_STS | R/W | A one indicates fan1 count limit has been exceeded. Write 1 to clear this bit, write 0 will be ignored. |
| 5 | VT2_STS | R/W | A one indicates a high limit of VT2 has been exceeded from temperature sensor. Write 1 to clear this bit, write 0 will be ignored. |
| 4 | VT1_STS | R/W | A one indicates a high limit of VT1 has been exceeded from temperature sensor. Write 1 to clear this bit, write 0 will be ignored. |
| 3 | V3_STS | R/W | A one indicates a high or low limit of VIN3 has been exceeded. Write 1 to clear this bit, write 0 will be ignored. |
| 2 | V2_STS | R/W | A one indicates a high or low limit of VIN2 has been exceeded. Write 1 to clear this bit, write 0 will be ignored. |
| 1 | V1_STS | R/W | A one indicates a high or low limit of VIN1 has been exceeded. Write 1 to clear this bit, write 0 will be ignored. |
| 0 | VCC_STS | R/W | A one indicates a high or low limit of VCC has been exceeded. Write 1 to clear this bit, write 0 will be ignored. |

## 6.9 Real Time Status Register 1 — Index 32h

Power on default: 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7 | FAN2EXC | R/W | A one indicates fan2 count limit has been exceeded. A zero indicates fan2 count is in the safe region. |
| 6 | FAN1EXC | R/W | A one indicates fan1 count limit has been exceeded. A zero indicates fan1 count is in the safe region. |
| 5 | VT2EXC | R/W | A one indicates a high limit of VT2 has been exceeded. A zero indicates VT2 is below the hysteresis limit. |

| | | | |
|---|---|---|---|
| 4 | VT1EXC | R/W | A one indicates a high limit of VT1 has been exceeded. A zero indicates VT1 is below the hysteresis limit. |
| 3 | V3EXC | R/W | A one indicates a high or low limit of VIN3 has been exceeded. A zero indicates VIN3 is in the safe region. |
| 2 | V2EXC | R/W | A one indicates a high or low limit of VIN2 has been exceeded. . A zero indicates VIN2 is in the safe region. |
| 1 | V1EXC | R/W | A one indicates a high or low limit of VIN1 has been exceeded. . A zero indicates VIN1 is in the safe region. |
| 0 | VCCEXC | R/W | A one indicates a high or low limit of VCC has been exceeded. . A zero indicates VCC is in the safe region. |

### 6.10 IRQ/SMI# ENABLE Register 2 — Index 33h

Power on default: 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-2 | Reserved | RO | |
| 1 | EN_TARF2_SMI | R/W | Target fan2 SMI enable bit. A zero disables the corresponding interrupt status bit for SMI# interrupt |
| 0 | EN_TARF1_SMI | R/W | Target fan1 SMI enable bit. A zero disables the corresponding interrupt status bit for SMI# interrupt |

### 6.11 Interrupt Status Register 2 — Index 34h

Power on default: 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-2 | Reserved | | |
| 1 | STS_TAR_FAN2 | R/W | A one indicates fan2 reading count is over then fan2 expect count, and the PWMOUT2 duty cycle is full more then the FAN FAULT TIME. Write 1 to clear this bit, write 0 will be ignored. |
| 0 | STS_TAR_FAN1 | R/W | A one indicates fan1 reading count is over then fan1 expect count, and the PWMOUT1 duty cycle is full more then the FAN FAULT TIME. Write 1 to clear this bit, write 0 will be ignored. |

### 6.12 FAN_FAULT/VOLT_FAULT/OVT ENABLE Register — Index 35h

Power on default: 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7 | EN_F2_FAULT | R/W | A one enables the fan2 fault status to be indicated in pin FAN_FUALT. |
| 6 | EN_ F1_FAULT | R/W | A one enables the fan1 fault status to be indicated in pin FAN_FUALT. |
| 5 | EN_T2_OVT | R/W | A one enables the VT2 fault status to be indicated in pin OVT. |
| 4 | EN_T1_OVT | R/W | A one enables the VT1 fault status to be indicated in pin OVT. |
| 3 | EN_V3_FAULT | R/W | A one enables the V3 fault status to be indicated in pin VOLT_FUALT pin. |
| 2 | EN_V2_FAULT | R/W | A one enables the V2 fault status to be indicated in pin VOLT _FUALT. |
| 1 | EN_V1_FAULT | R/W | A one enables the V1 fault status to be indicated in pin VOLT _FUALT. |
| 0 | EN_VCC_FAULT | R/W | A one enables the VCC fault status to be indicated in pin VOLT _FUALT. |

### 6.13 REAL TIME Fault Status Register 1 — Index 36h

Power on default: 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7 | FAN2_FAULT | RO | A one indicates fan2 count limit exceeding. |
| 6 | FAN1_FAULT | RO | A one indicates fan1 count limit exceeding. |
| 5 | VT2_OVT | RO | This bit will set to 1 from high limit of VT2 is exceeded until the temperature2 is under the VT2 hysteresis Limit |
| 4 | VT1_OVT | RO | This bit will set to 1 from high limit of VT1 is exceeded until the temperature1 is under the VT1 hysteresis Limit |
| 3 | V3_FAULT | RO | A one indicates a high or low limit of V3 exceeding. |
| 2 | V2_FAULT | RO | A one indicates a high or low limit of V2 exceeding. |
| 1 | V1_FAULT | RO | A one indicates a high or low limit of V1 exceeding. |
| 0 | VCC_FAULT | RO | A one indicates a high or low limit of VCC exceeding. |

### 6.14 5.1 CHIPID(1) Register – Index 5Ah

Power-on default [7:0] =0000_0010b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | CHIPID | RO | Chip ID, High byte (8'h02). |

### 6.15 CHIPID(2) Register – Index 5Bh

Power-on default [7:0] =0000_0100b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | CHIPID | RO | Chip ID, Low byte (8'h04). |

### 6.16 VENDOR ID(1) Register – Index 5Dh

Power-on default [7:0] =0001_1001b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | VENDOR1 | RO | Vendor ID, 8'h19 |

### 6.17 VENDOR ID(2) Register – Index 5Eh

Power-on default [7:0] =0011_0100b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | VENDOR2 | RO | Vendor ID, 8h34 |

### 6.18 Reset Timer Control Register -- Index 60h

Power on default: 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-6 | FAN2_MODE | R/W | **00:** FAN2 operates in **SPEED** mode. PWMOUT2 duty-cycle is |

| | | | |
|---|---|---|---|
| | | | automatically adjusted according to FAN2 EXPECT register.<br>**01:** FAN2 operates in **TEMPERATURE** mode. PWMOUT2 duty-cycle is automatically adjusted according to FAN2 EXPECT register, which will be automatically loaded into preset values according to the current temperature. (When PIN3 power-on trapped to 1, this mode is selected after power-on.)<br>**1X:** FAN2 operates in **MANUAL** mode. Software set the PWMOUT2 duty-cycle directly. |
| 5-4 | FAN1_MODE | R/W | **00:** FAN1 operates in **SPEED** mode. PWMOUT1 duty-cycle is automatically adjusted according to FAN1 EXPECT register.<br>**01:** FAN1 operates in **TEMPERATURE** mode. PWMOUT1 duty-cycle is automatically adjusted according to FAN1 EXPECT register, which will be automatically loaded into preset values according to the current temperature. (When PIN3 power-on trapped to 1, this mode is selected after power-on.)<br>**1X:** FAN1 operates in **MANUAL** mode. Software set the PWMOUT1 duty-cycle directly. |
| 3 | Reserved | | |
| 2 | KEEP_DROP_DUTY2 | R/W | Set to 1, keep PWMOUT2 duty-cycle decrease to DROP duty and hold. |
| 1 | KEEP_DROP_DUTY1 | R/W | Set to 1, keep PWMOUT1 duty-cycle decrease to DROP duty and hold. |
| 0 | EN_RESET_TIMER | R/W | Set to 1, enable interface_idle timer. Set to 0, disable the timer.<br>When the timer is enabled, if software doesn't access the this chip through GP_CLK and GP_DATA, the reset timer starts to count down according to the value set in INDEX 62H. When it counts down to zero, INDEX[72H, 73H] will be loaded into INDEX[74H,75H]. |

### 6.19 Fan Fault Time Register -- Index 61h

Power on default: B4h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | F_FAULT_TIME | R/W | This register determines the time of fan fault. Two conditions cause fan fault event: |

| | | | |
|---|---|---|---|
| | | | (1). When PWM_Duty reaches FFh, if the fan speed count can't reach the fan expect count in the time.<br>(2). When PWM_Duty reaches 00h, if the fan speed count can't reach the fan expect count in the time.<br>The unit of this register is 1 second. The default value is 180 seconds. |

### 6.20 RESET-Timer Time Register -- Index 62h

Power on default: 09h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | F_RESET_TIME | R/W | Interface idle time. The unit of this register is 1 minute. The default value is 10 minute. More details in INDEX 60H. |

### 6.21 FAN STEP Time defined Register -- Index 63h

Power on default: 00h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-4 | Reserved | RO | Read back will be 0 |
| 3:0 | TIME_STEP | R/W | This value determines the increasing or decreasing speed of PWM_Duty The smaller value, the faster speed. |

### 6.22 VT1 OFFSET Register -- Index 64h

Power on default: 09h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | T1OFFSET | R/W | VT1 temperature offset register. The offset value is representative in 2's complement. The real temperature value will be added by this offset and then will be put into temperature reading ( Value RAM 14h). The offset ranges from -128ºC to +127ºC.<br>7Fh : +127ºC. |

| | | | |
|---|---|---|---|
| | | | 01h : +5ºC.<br>00h : +0ºC.<br>FFh : -1ºC.<br>FEh : -2ºC.<br>80h : -128ºC. |

### 6.23 VT2 OFFSET Register -- Index 65h

Power on default: 09h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | T2OFFSET | R/W | VT2 temperature offset register. The offset value is representative in 2's complement. The real temperature value will be added by this offset and then will be put into temperature reading ( Value RAM 15h). The offset ranges from -128ºC to +127ºC.<br>7Fh : +127ºC.<br>01h : +5ºC.<br>00h : +0ºC.<br>FFh : -1ºC.<br>FEh : -2ºC.<br>80h : -128ºC. |

### 6.24 Reserved Register — Index 66h ~ 68h (FINTEK Use ONLY)

### 6.25 PWMOUT1 RAISE DUTY-CYCLE — Index 69h

Power on default: 30h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN1_RAISE_DUTY | R/W | PWMOUT1 will increasing duty-cycle from 0 to this value rapidly. |

### 6.26 PWMOUT2 RAISE DUTY-CYCLE — Index 6Ah

Power on default: 30h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN2_RAISE_DUTY | R/W | PWMOUT2 will increasing duty-cycle from 0 to this value rapidly |

### 6.27 PWMOUT1 DROP DUTY-CYCLE — Index 6Bh

Power on default: 25h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN1_DROP_DUTY | R/W | PWMOUT1 will decreasing duty-cycle to 0 from this value rapidly or keep duty-cycle in this value when CR60 bit1 set to 1. |

### 6.28 PWMOUT2 DROP DUTY-CYCLE — Index 6Ch

Power on default: 25h

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN2_DROP_DUTY | R/W | PWMOUT2 will decreasing duty-cycle to 0 from this value rapidly or keep duty-cycle in this value when CR60 bit2 set to 1. |

### 6.29 Reserved Register — Index 6Dh ~ 6Fh (FINTEK Use ONLY)

### 6.30 FAN1 Full Speed Count Register 0 — Index 70h

Power on default: 0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN1_FULL(MSB) | RO | When power on, the PWMOUT1 will output full duty cycle (FFh) to enable system FAN. After 10 seconds **when detecting FANIN1 signal**, assuming the fan has been fully turned on, the fan speed count detected will be recorded in the register. If there is no signal on |

| | | | |
|---|---|---|---|
| | | | FANIN1 after power on, the PWMOUT1 will keep outputting FFh duty cycle. |

### 6.31 FAN1 full speed Count Register 1— Index71h

Power on default: 1111_1111b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN1_FULL (LSB) | RO | When power on, the PWMOUT1 will output full duty cycle (FFh) to enable system FAN. After 10 seconds **when detecting FANIN1 signal**, assuming the fan has been fully turned on, the fan speed count detected will be recorded in the register. If there is no signal on FANIN1 after power on, the PWMOUT1 will keep outputting FFh duty cycle. |

### 6.32 FAN1 expect timeout speed Register — Index 72h

Power on default: 0000_0001b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN1_TSPEED (MSB) | R/W | The fan1 timeout count, when software idle timeout is happen, this count will be load to FAN1 expect register. The default count is 11/8 of FAN1_FULL reg. ( 73% of full speed).<br>This register is only valid at **HALF-AUTOMATIC(SPEED)** mode. |

### 6.33 FAN1 expect timeout speed Register — Index 73h

Power on default: 0101_1101b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN1_TSPEED (LSB) | R/W | The fan1 timeout count, when software idle timeout is happen, this count will be load to FAN1 expect register. The default count is 11/8 of FAN1_FULL reg. ( 73% of full speed).<br>This register is only valid at **HALF-AUTOMATIC(SPEED)** mode. |

### 6.34 FAN1 expect count Register-- Index 74h

Power on default [7:0] = 0000_0001b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN1_EXPECT (MSB) | R/W | User expect fan1 count value, program this register to control the expect fan1 speed |

### 6.35 FAN1 expect count Register-- Index 75h

Power on default [7:0] = 0101_1101b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN1_EXPECT (LSB) | R/W | User expect fan1 count value, program this register to control the expect fan1 speed. |

### 6.36 FAN1 PWM_duty -- Index 76h

Power on default: 1111_1111b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | PWM_DUTY1 | R/W | PWMOUT1 duty cycle. This register is programmable at Manual mode. At SPEED or TEMPERATURE mode, this register reflects current PWMOUT duty-cycle. |

### 6.37 FAN2 Full speed Register 0 — Index 80h

Power on default: 0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN2_FULL(MSB) | R/W | While PIN4 is set to PWMOUT mode, the PWMOUT2 will output full duty cycle (FFh) to enable system FAN. After 10 seconds **when detecting FANIN1 signal**, assuming the fan has been fully turned on, the fan speed count detected will be recorded in the register. If there is no signal on FANIN2 after power on, the PWMOUT2 will keep outputting FFh duty cycle. |

### 6.38 FAN2 full speed Register 1— Index 81h

Power on default: 1111_1111b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN2_FULL (LSB) | R/W | While PIN4 is set to PWMOUT mode, the PWMOUT2 will output full duty cycle (FFh) to enable system FAN. After 15 seconds, assuming the fan has been fully turned on, the fan speed count detected will be recorded in the register. |

### 6.39 FAN2 expect timeout speed Register — Index 82h

Power on default: 0000_0001b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN2_TSPEED | R/W | The fan2 timeout count, when software idle timeout is happen, this count will be load to FAN1 expect register. The default count is 11/8 of FAN2_FULL reg. ( 73% of full speed).<br>This register is only valid at **HALF-AUTOMATIC(SPEED)** mode. |

### 6.40 FAN2 expect timeout speed Register — Index 83h

Power on default: 0101_1101b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN2_TSPEED (LSB) | R/W | The fan2 timeout count, when software idle timeout is happen, this count will be load to FAN2 expect register. The default count is 11/8 of FAN2_FULL reg. ( 73% of full speed).<br>This register is only valid at **HALF-AUTOMATIC(SPEED)** mode. |

### 6.41 FAN2 expect count Register-- Index 84h

Power on default [7:0] = 0000_0001b

| Bit | Name | Attribute | Description |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 7-0 | FAN2_EXPECT (MSB) | R/W | User expect fan2 count value, program this register to control the expect fan2 speed |

### 6.42 FAN2 expect count Register-- Index 85h

Power on default [7:0] = 0101_1101b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | FAN2_EXPECT (LSB) | R/W | User expect fan2 count value, program this register to control the expect fan2 speed |

### 6.43 PWM_duty -- Index 86h

Power on default: 1111_1111b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | PWM_DUTY2 | R/W | PWMOUT2 duty cycle. This register is programmable at MANUAL mode. At SPEED or TEMPERATURE mode, this register reflects current PWMOUT duty-cycle. |

### 6.44 GPIOx Output Control Register – Index 90h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-4 | Reserved | RO | Read back will be 0; |
| 3 | GPIO3_OCTRL | R/W | GPIO3 output control. Set to 1 for output function. Set to 0 for input function(default). |
| 2 | GPIO2_OCTRL | R/W | GPIO2 output control. If this pin serves as IRQ/SMI#, this bit has no effect. Set to 1 for output function. Set to 0 for input function(default). |
| 1 | GPIO1_OCTRL | R/W | GPIO1 output control. Set to 1 for output function. Set to 0 for input function(default). |
| 0 | GPIO0_OCTRL | R/W | GPIO0 output control. Set to 1 for output function. Set to 0 for input function(default). |

### 6.45 GPIOx Output Data Register – Index 91h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-4 | Reserved | RO | Read back will be 0; |
| 3 | GPIO3_ODATA | R/W | GPIO3 output data. |
| 2 | GPIO2_ODATA | R/W | GPIO2 output data. |
| 1 | GPIO1_ODATA | R/W | GPIO1 output data. |
| 0 | GPIO0_ODATA | R/W | GPIO0 output data. |

### 6.46 GPIO1x Input Status Register – Index 92h

Power-on default [7:0] = N.A.

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-4 | Reserved | RO | Read back will be 0 |
| 3 | GPIO3_PSTS | RO | Read the GPIO3 data on the pin. |
| 2 | GPIO2_PSTS | RO | Read the GPIO2 data on the pin. If this pin serves as IRQ/SMI#, this bit always indicates 0, that is, read will return 0. |
| 1 | GPIO1_PSTS | RO | Read the GPIO1 data on the pin. |
| 0 | GPIO0_PSTS | RO | Read the GPIO0 data on the pin. |

## INDEX A0 -- AD registers – FAN1 CONTROL v.s. TEMPERATURE 1

### 6.47 VT1 BOUNDARY 1 TEMPERATURE – Index A0h

Power-on default [7:0] =0011_1100b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | BOUND1TMP | R/W | The 1st BOUNDARY temperature for VT1 in temperature mode.<br>When VT1 temperature is **exceed** this boundary, FAN1 segment **1** speed count registers(INDEX A4h, A5h) will be loaded into FAN1 expect count registers(INDEX 74h,75h).<br>When VT1 temperature is **below** this boundary, FAN1 segment **2** speed count registers(INDEX A6h, A7h) will be loaded into FAN1 |

| | | | |
|---|---|---|---|
| | | | expect count registers(INDEX 74h,75h). |

### 6.48 VT1 BOUNDARY 2 TEMPERATURE – Index A1h

Power-on default [7:0] =0011_0010b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | BOUND2TMP | R/W | The 2nd BOUNDARY temperature for VT1 in temperature mode.<br>When VT1 temperature is **exceed** this boundary, FAN1 segment **2** speed count registers(INDEX A6h, A7h) will be loaded into FAN1 expect count registers(INDEX 74h,75h).<br>When VT1 temperature is **below** this boundary, FAN1 segment **3** speed count registers(INDEX A8h, A9h) will be loaded into FAN1 expect count registers(INDEX 74h,75h). |

### 6.49 VT1 BOUNDARY 3 TEMPERATURE – Index A2h

Power-on default [7:0] =0010_1000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | BOUND3TMP | R/W | The 3rd BOUNDARY temperature for VT1 in temperature mode.<br>When VT1 temperature is **exceed** this boundary, FAN1 segment **3** speed count registers(INDEX A8h, A9h) will be loaded into FAN1 expect count registers(INDEX 74h,75h).<br>When VT1 temperature is **below** this boundary, FAN1 segment **4** speed count registers(INDEX AAh, ABh) will be loaded into FAN1 expect count registers(INDEX 74h,75h). |

### 6.50 VT1 BOUNDARY 4 TEMPERATURE – Index A3h

Power-on default [7:0] =0001_1110b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | BOUND4TMP | R/W | The 4th BOUNDARY temperature for VT1 in temperature mode.<br>When VT1 temperature is **exceed** this boundary, FAN1 segment **4** speed count registers(INDEX AAh, ABh) will be loaded into FAN1 |

| | | | |
|---|---|---|---|
| | | | expect count registers(INDEX 74h,75h).<br>When VT1 temperature is **below** this boundary, FAN1 segment **5** speed count registers(INDEX ACh, ADh) will be loaded into FAN1 expect count registers(INDEX 74h,75h). |

### 6.51 FAN1 SEGMENT 1 SPEED COUNT (MSB) – Index A4h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC1SPEED (MSB) | R/W | The MSB of 1st expected fan speed for FAN1 in temperature mode. After detecting FAN1 full speed, 00h will be loaded into this register. |

### 6.52 FAN1 SEGMENT 1 SPEED COUNT (LSB) – Index A5h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC1SPEED (LSB) | R/W | The LSB of 1st expected fan speed for FAN1 in temperature mode. After detecting FAN1 full speed, 00h will be loaded into this register. |

### 6.53 FAN1 SEGMENT 2 SPEED COUNT (MSB) – Index A6h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC2SPEED (MSB) | R/W | The MSB of 2nd expected fan speed for FAN1 in temperature mode. After detecting FAN1 full speed count, the high byte of 112.5% FAN1 FULL SPEED COUND will be loaded into this register. (ie. 88% of FULL SPEED RPM) |

### 6.54 FAN1 SEGMENT 2 SPEED COUNT (LSB) – Index A7h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 7-0 | SEC2SPEED (LSB) | R/W | The LSB of 2nd expected fan speed for FAN1 in temperature mode. After detecting FAN1 full speed count, the low byte of 112.5% FAN1 FULL SPEED COUND will be loaded into this register. |

### 6.55 FAN1 SEGMENT 3 SPEED COUNT (MSB) – Index A8h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC3SPEED (MSB) | R/W | The MSB of 3rd expected fan speed for FAN1 in temperature mode. After detecting FAN1 full speed count, the high byte of 131.25% FAN1 FULL SPEED COUND will be loaded into this register. (ie. 76% of FULL SPEED RPM) |

### 6.56 FAN1 SEGMENT 3 SPEED COUNT (LSB) – Index A9h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC3SPEED (LSB) | R/W | The LSB of 3rd expected fan speed for FAN1 in temperature mode. After detecting FAN1 full speed count, the low byte of 131.25% FAN1 FULL SPEED COUND will be loaded into this register. (ie. 76% of FULL SPEED RPM) |

### 6.57 FAN1 SEGMENT 4 SPEED COUNT (MSB) – Index AAh

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC4SPEED (MSB) | R/W | The MSB of 4th expected fan speed for FAN1 in temperature mode. After detecting FAN1 full speed count, the high byte of 156.25% FAN1 FULL SPEED COUND will be loaded into this register. (ie. 64% of FULL SPEED RPM) |

### 6.58 FAN1 SEGMENT 4 SPEED COUNT (LSB) – Index ABh

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC4SPEED (LSB) | R/W | The LSB of 4th expected fan speed for FAN1 in temperature mode. After detecting FAN1 full speed count, the low byte of 156.25% FAN1 FULL SPEED COUND will be loaded into this register. (ie. 64% of FULL SPEED RPM) |

### 6.59 FAN1 SEGMENT 5 SPEED COUNT (MSB) – Index ACh

Power-on default [7:0] =0000_0000b

| Bit | Name | R/W | Description |
|---|---|---|---|
| 7-0 | SEC5SPEED (MSB) | R/W | The MSB of 5th expected fan speed for FAN1 in temperature mode. After detecting FAN1 full speed count, FFh will be loaded into this register. |

### 6.60 FAN1 SEGMENT 5 SPEED COUNT (LSB) – Index ADh

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC5SPEED (LSB) | R/W | The LSB of 5th expected fan speed for FAN1 in temperature mode. After detecting FAN1 full speed count, FFh will be loaded into this register. |

## INDEX B0 -- BD registers – FAN2 CONTROL v.s. TEMPERATURE 2

### 6.61 VT2 BOUNDARY 1 TEMPERATURE – Index B0h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 7-0 | BOUND1TMP | R/W | The 1st BOUNDARY temperature for VT2 in temperature mode.<br>When VT2 temperature is **exceed** this boundary, FAN2 segment **1** speed count registers(INDEX B4h, B5h) will be loaded into FAN1 expect count registers(INDEX 84h,85h).<br>When VT2 temperature is **below** this boundary, FAN2 segment **2** speed count registers(INDEX B6h, B7h) will be loaded into FAN2 expect count registers(INDEX 84h,85h). |

### 6.62 VT2 BOUNDARY 2 TEMPERATURE – Index B1h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | BOUND2TMP | R/W | The 2nd BOUNDARY temperature for VT2 in temperature mode.<br>When VT2 temperature is **exceed** this boundary, FAN2 segment **2** speed count registers(INDEX B6h, B7h) will be loaded into FAN2 expect count registers(INDEX 84h,85h).<br>When VT2 temperature is **below** this boundary, FAN2 segment **3** speed count registers(INDEX B8h, B9h) will be loaded into FAN2 expect count registers(INDEX 84h,85h). |

### 6.63 VT2 BOUNDARY 3 TEMPERATURE – Index B2h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | BOUND3TMP | R/W | The 3rd BOUNDARY temperature for VT2 in temperature mode.<br>When VT2 temperature is **exceed** this boundary, FAN2 segment **3** speed count registers(INDEX B8h, B9h) will be loaded into FAN2 expect count registers(INDEX 84h,85h).<br>When VT2 temperature is **below** this boundary, FAN2 segment **4** speed count registers(INDEX BAh, BBh) will be loaded into FAN2 expect count registers(INDEX 84h,85h). |

### 6.64 VT2 BOUNDARY 4 TEMPERATURE – Index B3h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | BOUND4TMP | R/W | The 4th BOUNDARY temperature for VT2 in temperature mode.<br>When VT2 temperature is **exceed** this boundary, FAN2 segment **4** speed count registers(INDEX BAh, BBh) will be loaded into FAN2 expect count registers(INDEX 84h,85h).<br>When VT2 temperature is **below** this boundary, FAN2 segment 5 speed count registers(INDEX BCh, BDh) will be loaded into FAN2 expect count registers(INDEX 84h,85h). |

### 6.65 FAN2 SEGMENT 1 SPEED COUNT (MSB) – Index B4h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC1SPEED (MSB) | R/W | The MSB of 1st expected fan speed for FAN2 in temperature mode.<br>After detecting FAN2 full speed, 00h will be loaded into this register. |

### 6.66 FAN2 SEGMENT 1 SPEED COUNT (LSB) – Index B5h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC1SPEED (LSB) | R/W | The LSB of 1st expected fan speed for FAN2 in temperature mode.<br>After detecting FAN2 full speed, 00h will be loaded into this register. |

### 6.67 FAN2 SEGMENT 2 SPEED COUNT (MSB) – Index B6h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC2SPEED | R/W | The MSB of 2nd expected fan speed for FAN2 in temperature mode. |

| | | | |
|---|---|---|---|
| | (MSB) | | After detecting FAN2 full speed count, the high byte of 112.5% FAN2 FULL SPEED COUND will be loaded into this register. (ie. 88% of FULL SPEED RPM) |

### 6.68 FAN2 SEGMENT 2 SPEED COUNT (LSB) – Index B7h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC2SPEED (LSB) | R/W | The LSB of 2nd expected fan speed for FAN2 in temperature mode. After detecting FAN2 full speed count, the low byte of 112.5% FAN2 FULL SPEED COUND will be loaded into this register. (ie. 88% of FULL SPEED RPM) |

### 6.69 FAN2 SEGMENT 3 SPEED COUNT (MSB) – Index B8h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC3SPEED (MSB) | R/W | The MSB of 3rd expected fan speed for FAN2 in temperature mode. After detecting FAN2 full speed count, the high byte of 131.25% FAN2 FULL SPEED COUND will be loaded into this register. (ie. 76% of FULL SPEED RPM) |

### 6.70 FAN2 SEGMENT 3 SPEED COUNT (LSB) – Index B9h

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC3SPEED (LSB) | R/W | The LSB of 3rd expected fan speed for FAN2 in temperature mode. After detecting FAN2 full speed count, the low byte of 131.25% FAN2 FULL SPEED COUND will be loaded into this register. (ie. 76% of FULL SPEED RPM) |

### 6.71 FAN2 SEGMENT 4 SPEED COUNT (MSB) – Index BAh

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC4SPEED (MSB) | R/W | The MSB of 4th expected fan speed for FAN2 in temperature mode. After detecting FAN2 full speed count, the high byte of 156.25% FAN2 FULL SPEED COUND will be loaded into this register. (ie. 64% of FULL SPEED RPM) |

### 6.72 FAN2 SEGMENT 4 SPEED COUNT (LSB) – Index BBh

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC4SPEED (LSB) | R/W | The LSB of 4th expected fan speed for FAN2 in temperature mode. After detecting FAN2 full speed count, the low byte of 156.25% FAN2 FULL SPEED COUND will be loaded into this register. (ie. 64% of FULL SPEED RPM) |

### 6.73 FAN2 SEGMENT 5 SPEED COUNT (MSB) – Index BCh

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|
| 7-0 | SEC5SPEED (MSB) | R/W | The MSB of 5th expected fan speed for FAN2 in temperature mode. After detecting FAN2 full speed count, FFh will be loaded into this register. |

### 6.74 FAN2 SEGMENT 5 SPEED COUNT (LSB) – Index BDh

Power-on default [7:0] =0000_0000b

| Bit | Name | Attribute | Description |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 7-0 | SEC5SPEED (LSB) | R/W | The LSB of 5th expected fan speed for FAN2 in temperature mode. After detecting FAN2 full speed count, FFh will be loaded into this register. |

### 6.75 Reserved Register – Index F0h ~ FFh (Fintek Use Only)



# 7 Electron Characteristic

## 7.1 Absolute Maximum Ratings

| PARAMETER | RATING | UNIT |
|---|---|---|
| Power Supply Voltage | -0.5 to 4.0 | V |
| Input Voltage | -0.5 to 5.5 | V |
| Operating Temperature | 0 to +70 | ° C |
| Storage Temperature | -55 to +150 | ° C |

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.

## 7.2 DC Characteristics

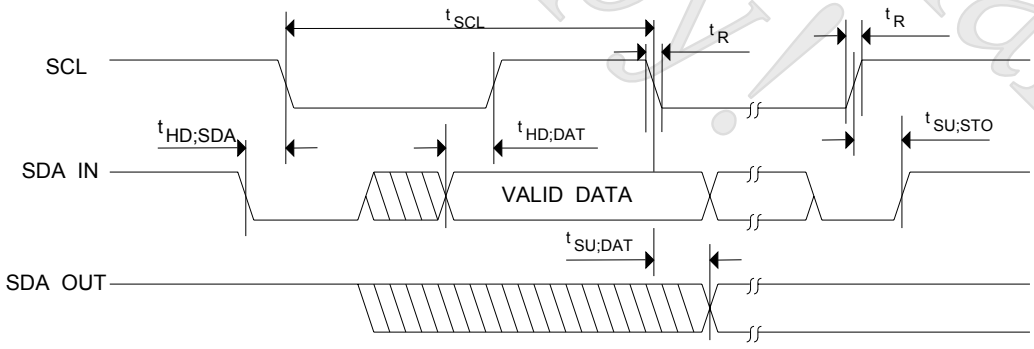
(Ta = 0° C to 70°C, VDD = 3.3V ± 10%, VSS = 0V, Tja = 0.73 + Ta (air flow = 0 LPF), Tja(max) = 150°C )

| PARAMETER | SYM. | MIN. | TYP. | MAX. | UNIT | CONDITIONS |
|---|---|---|---|---|---|---|
| **$I/O_{12t}$ - TTL level bi-directional pin with source-sink capability of 12 mA** | | | | | | |
| Input Low Voltage | VIL | | | 0.8 | V | |
| Input High Voltage | VIH | 2.0 | | | V | |
| Output Low Voltage | VOL | | | 0.4 | V | IOL = 12 mA |
| Output High Voltage | VOH | 2.4 | | | V | IOH = - 12 mA |
| Input High Leakage | ILIH | | | +10 | μA | VIN = VDD |
| Input Low Leakage | ILIL | | | -10 | μA | VIN = 0V |
| **$I/O_{12ts}$ - TTL level bi-directional pin with source-sink capability of 12 mA and schmitt-trigger level input** | | | | | | |
| Input Low Threshold Voltage | Vt- | 0.5 | 0.8 | 1.1 | V | VDD = 3.3 V |
| Input High Threshold Voltage | Vt+ | 1.6 | 2.0 | 2.4 | V | VDD = 3.3 V |
| Hysteresis | VTH | 0.5 | 1.2 | | V | VDD = 3.3 V |
| Output Low Voltage | VOL | | | 0.4 | V | IOL = 12 mA |
| Output High Voltage | VOH | 2.4 | | | V | IOH = - 12 mA |
| Input High Leakage | ILIH | | | +10 | μA | VIN = VDD |
| Input Low Leakage | ILIL | | | -10 | μA | VIN = 0V |

7.2 DC Characteristics, continued

| PARAMETER | SYM. | MIN. | TYP. | MAX. | UNIT | CONDITIONS |
|---|---|---|---|---|---|---|
| **$OUT_{12t}$ - TTL level output pin with source-sink capability of 12 mA** | | | | | | |
| Output Low Voltage | VOL | | | 0.4 | V | IOL = 12 mA |
| Output High Voltage | VOH | 2.4 | | | V | IOH = -12 mA |
| **$OD_8$ - Open-drain output pin with sink capability of 8 mA** | | | | | | |
| Output Low Voltage | VOL | | | 0.4 | V | IOL = 8 mA |
| **$OD_{12}$ - Open-drain output pin with sink capability of 12 mA** | | | | | | |
| Output Low Voltage | VOL | | | 0.4 | V | IOL = 12 mA |
| **$OD_{16}$ - Open-drain output pin with sink capability of 16 mA** | | | | | | |
| Output Low Voltage | VOL | | | 0.4 | V | IOL = 16 mA |
| **$IN_t$ - TTL level input pin** | | | | | | |
| Input Low Voltage | VIL | | | 0.8 | V | |
| Input High Voltage | VIH | 2.0 | | | V | |
| Input High Leakage | ILIH | | | +10 | μA | VIN = VDD |
| Input Low Leakage | ILIL | | | -10 | μA | VIN = 0 V |
| **$IN_{ts}$ - TTL level Schmitt-triggered input pin** | | | | | | |
| Input Low Threshold Voltage | Vt- | 0.5 | 0.8 | 1.1 | V | VDD = 3.3V |
| Input High Threshold Voltage | Vt+ | 1.6 | 2.0 | 2.4 | V | VDD = 3.3V |
| Hysteresis | VTH | 0.5 | 1.2 | | V | VDD = 3.3 V |
| Input High Leakage | ILIH | | | +10 | μA | VIN = VDD |
| Input Low Leakage | ILIL | | | -10 | μA | VIN = 0 V |

## 7.3 AC Characteristics




Serial Bus Timing Diagram

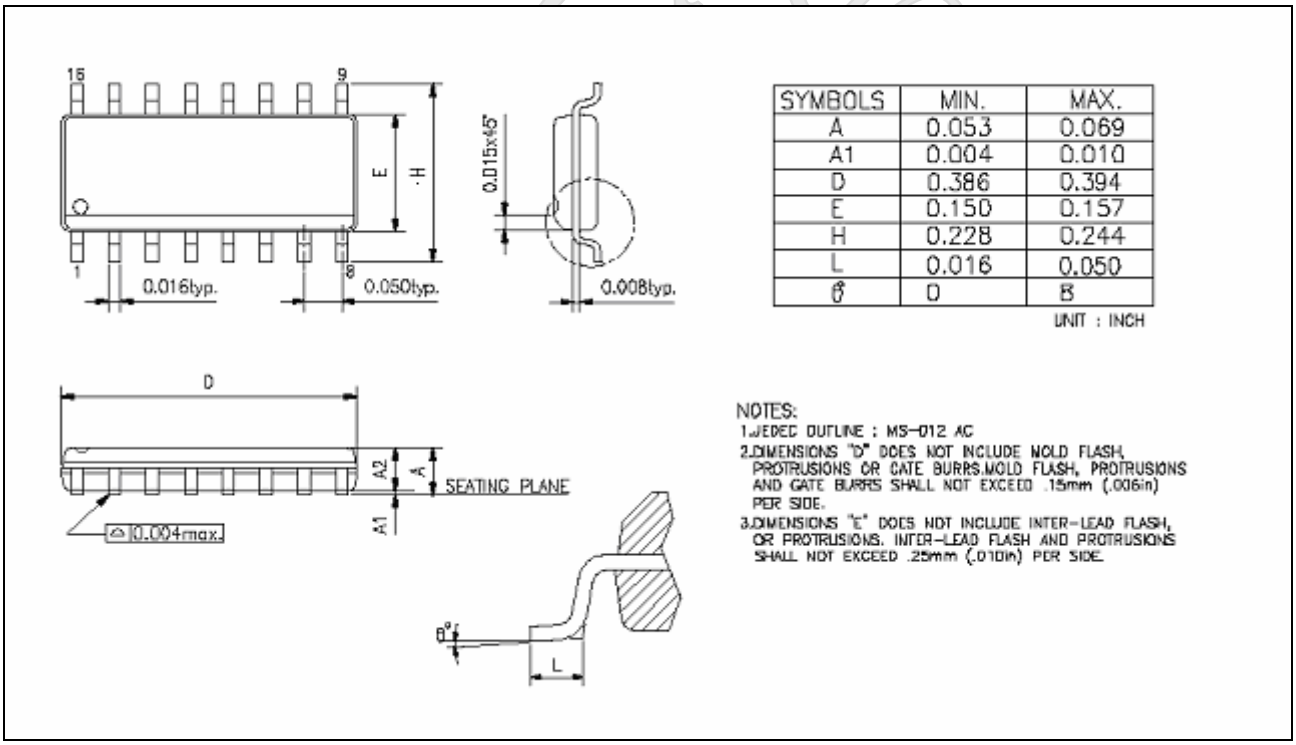
**Serial Bus Timing**

| PARAMETER | SYMBOL | MIN. | MAX. | UNIT |
|---|---|---|---|---|
| SCL clock period | $t_{SCL}$ | 10 | | uS |
| Start condition hold time | $t_{HD;SDA}$ | 4.7 | | uS |
| Stop condition setup-up time | $t_{SU;STO}$ | 4.7 | | uS |
| DATA to SCL setup time | $t_{SU;DAT}$ | 120 | | nS |
| DATA to SCL hold time | $t_{HD;DAT}$ | 5 | | nS |
| SCL and SDA rise time | $t_R$ | | 1.0 | uS |
| SCL and SDA fall time | $t_F$ | | 300 | nS |

# 8 Ordering Information

| Part Number | Package Type | Production Flow |
|---|---|---|
| **F75373S** | 16 PIN SOP | Commercial, 0°C to +70°C |
| **F75373SG** | 16 PIN SOP (Green Package) | Commercial, 0°C to +70°C |

# 9 Package Dimensions (16SOP 150mil)



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