



## IT8712/8705F

### IT8712/8705 Fan speed control methods

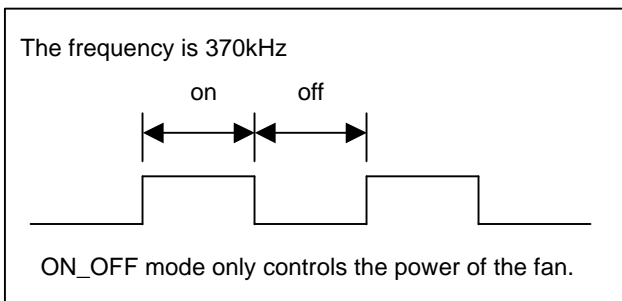
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#### 1.0 Preface

There are 2 different main modes to control fan speed, SmartGuardian mode, and ON\_OFF mode. Under SmartGuardian, there are also 2 submodes, automatic mode & software programming mode. In either of the SmartGuardian modes, Pulse Width Modulators (PWM) are used to output N\_CTRL to the power of the fan. In the On-Off mode, the fans are either on or off. SmartGuardian is a trademark of Integrated Technology Express, Inc. (ITE).

#### 1.1 On-Off Mode

The on-off mode is designed to control the fans directly or in conjunction with the use of an external thermal monitor. In the On-Off Mode, there is no need to enable the environmental controller. Simply program the fans on and off with bits 0, 1, 2 of the fan control register, index 14h. Write a one to bit 7 for an active high control polarity (required if the IT8712 reference design is followed). Then write a one to bit 0 to turn on fan 1, etc. The operation of the on/off mode is shown in the diagram below.



ON-OFF Mode Register Programming Example:

Address index	Set value	Description
"14h"	81h	Sets active high polarity and turns on fan 1

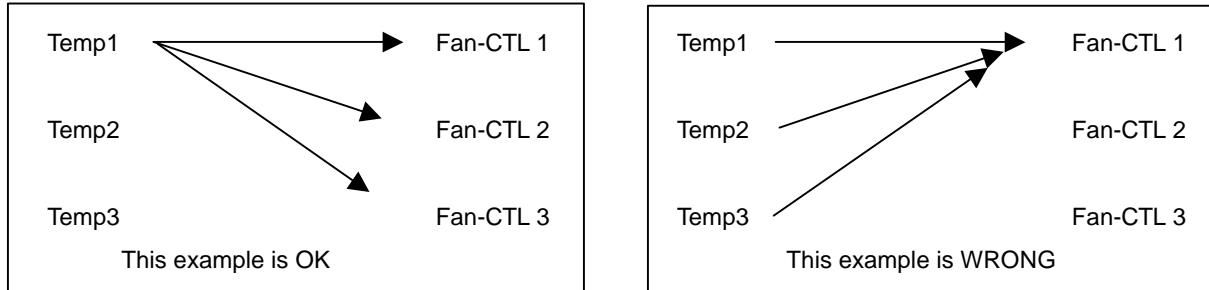


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## 1.2 SmartGuardian Automatic mode

fan speed is automatically adjusted according to the different temperature input ranges.

There are 3 different temperature monitors (address index “29h”, “2Ah”, “2Bh”) and 3 different fan control outputs. Any, or all, of the fan controls can use any one of the temperature monitors. For different temperatures, we can set different speed, and PWM.



Any temperature monitor can be used for all of the reference for the fan control.

But each fan control may use only 1 temperature monitor at a time for its thermal input.

In the example below, Fan1 uses temperature monitor 2 for reference, fan2 uses temperature monitor 1 for reference. And the speed of the fans are set according to the PWM value respectively. Fan3 is always on

In the below example, Bold and underlined variables may be modified via register settings

- A. **Fan 1** will run at different speed according to **temperature monitor 2's reading**.
1. From room temperature, and below **32°C**, the fan stops.
  2. **32°C ~47°C**, the fan runs at the PWM value, **45h**
  3. **48°C ~63°C** the fan runs at the PWM value, **60h**
  4. **64°C ~79°C** the fan runs at the PWM value, **70h**
  5. Above **80°C**, the fan runs at the full speed of PWM, 7Fh)
  6. **26°C~31°C**, the fan still runs at the PWM value, **45h** Below **25°C**, fan stops at the PWM value, 00h.
- B. **Fan 2** will run at different speed according to **temperature monitor 1's reading**.
1. From room temperature, and below **40°C**, the fan stops.
  2. **40°C ~49°C**, the fan runs at the PWM value, **33h**
  3. **50°C ~59°C**, the fan runs at the PWM value, **55h**
  4. **60°C ~69°C**, the fan runs at the PWM value, **77h**
  5. Above **70°C**, the fan runs at the full speed of PWM, 7Fh
  6. **31°C~39°C**, the fan still runs at the PWM value, **33h** Below **30°C**, fan stops at the PWM value, 00h.
- C. **fan 3 is always ON**



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Thermal controller SmartGuardian Automatic mode Register programming example Address Index settings.

ENABLE monitor

Address index	Set value	Description
"00h"	01h	IT8705/8712 monitor operation enable
"13h"	73h	Fan_in1-3 monitor enable, fan1,fan2 set to smartGuardian mode fan3 ON/OFF mode
"51h"	38h	Temperature1-3 Monitor enable( if use thermal resistor)

Set Mode

"14h"	84h	Polarity =1, Set fan3 ON
"15h"	81h	1. Bit7 =1, SmartGuardian automatic mode enable 2. Fan1 According Temperature monitor 2
"16h"	80h	1. Bit7 =1, SmartGuardian automatic mode enable 2. Fan2 According Temperature monitor 1
"17h"	xxh	Fan3 Don't care

SET Fan1 PWM According Temperature monitor 2

"64h"	50h	Set over temperature limit 80°C
"63h"	40h	Set high speed temperature limit 64°C
"62h"	30h	Set medium speed temperature limit 48°C
"61h"	20h	Set low speed temperature 32°C
"60h"	19h	Set low speed temperature limit of FAN_OFF 25°C
"67h"	70h	Set 64°C ~79°C, fan runs at the PWM value of 70h
"66h"	60h	Set 48°C ~63°C, fan runs at the PWM value of 60h
"65h"	45h	Set 32°C ~47°C, fan runs at the PWM value of 45h

SET Fan2 PWM According Temperature monitor 1

"6Ch"	46h	Set over temperature limit 70°C
"6Bh"	3Ch	Set high speed temperature limit 60°C
"6Ah"	32h	Set medium speed temperature limit 50°C
"69h"	28h	Set low speed temperature 40°C
"68h"	1Eh	Set low speed temperature limit of FAN_OFF 30°C
"6Fh"	77h	Set 60°C ~69°C, fan runs at the PWM value of 77h
"6Eh"	55h	Set 50°C ~59°C, fan runs at the PWM value of 55h
"6Dh"	33h	Set 40°C ~49°C, fan runs at the PWM value of 33h



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SET Fan3 always ON

"74h"	XXh	Don't care
"73h"	XXh	Don't care
"72h"	XXh	Don't care
"71h"	XXh	Don't care
"70h"	XXh	Don't care
"77h"	XXh	Don't care
"76h"	XXh	Don't care
"75h"	XXh	Don't care

### 1.3 SmartGuardian Software programming mode

In the SmartGuardian Software mode, the fan runs according to the software setting of the PWM value. It is the responsibility of BIOS or external application software to monitor the temperature inputs (registers 29h, 2Ah, 2Bh) and program the appropriate PWM value (registers 15h, 16h, 17h) required for a given temperature.

Example

Fan1 PWM 55h

Fan2 PWM 75h

Fan3 PWM 45h

Thermal controller SmartGuardian Software Mode Register Programming example Address Index settings

ENABLE monitor

Address index	Set value	Description
"00h"	01h	IT8705/8712 monitor operation enable
"13h"	77h	Fan_in1-3 monitor enable, fan1,fan2,fan3 set to smartGuardian mode
"51h"	38h	Temperature1-3 monitor enable( if use thermal resistor)

"14h"	8xh	Polarity =1 , bit2,1,0 don't care
"15h"	55h	Set fan1 PWM =55h
"16h"	75h	Set fan2 PWM =75h
"17h"	45h	Set fan3 PWM =45h

### 1.4 Note

Index=14h , bit7 Polarity bit is set according to the application circuit,  
For current AP CKT, this bit is always set to 1.