F71805F/FG

Super H/W Monitor + LPC IO

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F71805 Datasheet Revision History

Version	Date	Page	Revision History
0.20P	07/07/2004	-	Preliminary Release Version.
0.21P	07/28/2004		Revised PWM frequency range.
0.22P	10/12/2004	10	Added FANCTL Functions.
		22	Revised Voltage Fault Enable Register (Index 29h bit 7).
		-	Modified Application Circuit.
0.23P	04/15/2005	91	Added “Green Package” ordering information
0.24P	09/05/2006	16	Modified typo.
		-	Added PWM Output frequency setting description.
0.25P	12/28/2006	4	Added Patent Note.

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1. General Description

The F71805 is the featured IO chip specifically for PC system. Equipped with one IEEE 1284 parallel port, two UART port and FDC, F71805 provides SIR and Flash ROM Interface. Integrated with hardware monitor, F71805 supports 9 sets of voltage sensor and 4 voltage fault signal outputs, 3 sets of creative auto-controlling fans and 3 temperature sensor pins for the accurate current type temp. measurement for CPU thermal diode or external transistors 2N3906.

The F71805 provides flexible features for multi-directional application. For instance, supports 24 GPIO pins which include pulse/level mode selection, IRQ sharing function also designed in UART feature for particular usage and accurate current mode H/W monitor will be worth in measurement of temperature. The F71805 is powered by 3.3V voltage, with the LPC interface in the package of 128-QFP.

2. Features

General Functions

- Comply with LPC Spec. 1.0
- Supports 24 GPIO pins. One set of GPIO supports High/Low Level/Pulse selection.
- 48 MHz clock input

FDC

- Compatible with IBM PC AT disk drive systems
- Variable write pre-compensation with track selectable capability
- Support vertical recording format
- DMA enable logic
- 16-byte data FIFOs
- Support floppy disk drives and tape drives
- Detects all overrun and under run conditions
- Built-in address mark detection circuit to simplify the read electronics
- Completely compatible with industry standard 82077
- 360K/720K/1.2M/1.44M/2.88M format; 250K, 300K, 500K, 1M, 2M bps data transfer rate
- Support 3-mode FDD, and its Win95/98/2K/XP driver

UART

- Two high-speed 16C550 compatible UART with 16-byte FIFOs
- Fully programmable serial-interface characteristics

- Baud rate up to 115.2K

Infrared

- Support IrDA version 1.0 SIR protocol with maximum baud rate up to 115.2K bps

Flash ROM Interface

- Up to 4M bits flash ROM supported

Parallel Port

- One PS/2 compatible bi-directional parallel port
- Support Enhanced Parallel Port (EPP) – Compatible with IEEE 1284 specification
- Support Extended Capabilities Port (ECP) – Compatible with IEEE 1284 specification
- Enhanced printer port back-drive current protection

Hardware Monitor Functions

- 3 current type accurate (±3℃) thermal inputs for CPU thermal diode and 2N3906 transistors
- 9 voltage monitoring inputs (8 external and Vcc power)
- 4 voltage_fault# hardware signal outputs
- 3 fan speed monitoring inputs
- 3 fan speed auto-control --- support 3 wire and 4 wire fans
- WATCHDOG comparison of all monitored values
- Issue PME#, OVT# and independent Voltage_fault #

Package

- 128-pin PQFP

Noted: Patented TW207103 TW207104 US6788131 B1 TW235231 TW237183 TWI263778

3. Key Specifications

- Supply Voltage 3.0V to 3.6V
- Operating Supply Current 5 mA typ.

4. Pin Configuration

Figure 1

5. Pin Description

I/O_{12t} - TTL level bi-directional pin with 12 mA source-sink cap ability.

I/OOD_{12t} - TTL level bi-directional pin, can select to OD or OUT by register, with 12 mA source-sink capability.

I/OOD_{16t} - TTL level bi-directional pin, can select to OD or OUT by register, with 16 mA source-sink capability.

I/OD_{12ts5V} - TTL level bi-directional pin and schmitt trigger, Open-drain output with 12 mA sink capability, 5V tolerance.

I/O_{8t} - TTL level bi-directional pin with 8 mA sink capability.

$I/O_{8t\text{-}u47,5V}$ - TTL level bi-directional pin with 8 mA sink capability, pull-up 47k ohms, 5V tolerance.

I/O_{12ts5V} - TTL level bi-directional pin and schmitt trigger with 12 mA sink capability, 5V tolerance.

O_{12} - Output pin with 12 mA source-sink capability.

O_8 - Output pin with 8 A source-sink capability.

AOUT - Output pin(Analog).

OD_{12} - Open-drain output pin with 12 mA sink capability.

OD_{24} - Open-drain output pin with 24 mA sink capability.

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

IN_{t5V} - TTL level input, 5V tolerance.

IN_{ts5V} - TTL level input pin and schmitt trigger, 5V tolerance.

AIN - Input pin(Analog).

P - Power.

5.1 Power Pin

Pin No.	Pin Name	Type	Description
4,35,99	VCC	P	Power supply voltage input with 3.3V
86	AGND(D-)	P	Analog GND
15,43,67,117	GNDD	P	Digital GND

5.2 LPC Interface

Pin No.	Pin Name	Type	PWR	Description
45	LRESET#	IN_{ts}	VCC	Reset signal. It can connect to PCIRST# signal on the host.
36	LDRQ#	O_{12}	VCC	Encoded DMA Request signal.
37	SERIRQ	I/O_{12t}	VCC	Serial IRQ input/Output.
46	LFRAM#	IN_{ts}	VCC	Indicates start of a new cycle or termination of a broken

				cycle.
41-38	LAD[3:0]	I/O_{12t}	VCC	These signal lines communicate address, control, and data information over the LPC bus between a host and a peripheral.
42	PCICLK	IN_{ts}	VCC	PCI clock input.
44	CLKIN	IN_{ts}	VCC	System clock input. According to the input frequency 48MHz.

5.3 FDC

Pin No.	Pin Name	Type	PWR	Description
57	DENSEL#	OD_{24}	VCC	Drive Density Select. Set to 1 - High data rate.(500Kbps, 1Mbps) Set to 0 – Low data rate. (250Kbps, 300Kbps)
58	MTRA#	OD_{24}	VCC	Motor A On. When set to 0, this pin enables disk drive 0. This is an open drain output.
60	DRVA#	OD_{24}	VCC	Drive Select A. When set to 0, this pin enables disk drive A. This is an open drain output.
62	WDATA#	OD_{24}	VCC	Write data. This logic low open drain writes pre-compensation serial data to the selected FDD. An open drain output.
63	DIR#	OD_{24}	VCC	Direction of the head step motor. An open drain output. Logic 1 = outward motion Logic 0 = inward motion
64	STEP#	OD_{24}	VCC	Step output pulses. This active low open drain output produces a pulse to move the head to another track.
65	HDSEL#	OD_{24}	VCC	Head select. This open drain output determines which disk drive head is active. Logic 1 = side 0 Logic 0 = side 1
66	WGATE#	OD_{24}	VCC	Write enable. An open drain output.
68	RDATA#	IN_{ts5V}	VCC	The read data input signal from the FDD.
69	TRK0#	IN_{ts5V}	VCC	Track 0. This Schmitt-triggered input from the disk drive is active low when the head is positioned over the outermost track.
70	INDEX#	IN_{ts5V}	VCC	This Schmitt-triggered input from the disk drive is active low when the head is positioned over the beginning of a track marked by an index hole.
71	WPT#	IN_{ts5V}	VCC	Write protected. This active low Schmitt input from the disk drive indicates that the diskette is write-protected.
72	DSKCHG#	IN_{ts5V}	VCC	Diskette change. This signal is active low at power on and whenever the diskette is removed.

5.4 UART Port and SIR

Pin No.	Pin Name	Type	PWR	Description
82	IRTX	O_{12}	VCC	Infrared Transmitter Output.
83	IRRX	IN_{ts}	VCC	Infrared Receiver input.
118	DCD1#	IN_{t5V}	VCC	Data Carrier Detect. An active low signal indicates the modem or data set has detected a data carrier.
119	RI1#	IN_{t5V}	VCC	Ring Indicator. An active low signal indicates that a ring signal is being received from the modem or data set.

120	CTS1#	IN_{t5V}	VCC	Clear To Send is the modem control input.
121	DTR1#/JP1	$I/O_{8t\text{-}u47,5V}$	VCC	UART 1 Data Terminal Ready. An active low signal informs the modem or data set that controller is ready to communicate. (Internal 47k pulled high and disable after power on strapping) Power on strapping: Default is high. Flash Rom Interface Address Segment 1 Enable (FFFC0000h-FFFFFFFFh, 000E0000h-000FFFFFh). (000E0000h-000EFFFFh Can be disabled by register change.)
122	RTS1#/JP2	$I/O_{8t\text{-}u47,5V}$	VCC	UART 1 Request To Send. An active low signal informs the modem or data set that the controller is ready to send data.(Internal 47k pulled high and disable after power on strapping) Power on strapping: Default is high. Flash Rom Interface Address Segment 2 Enable (FFEE0000h-FFEFFFFFh).
123	DSR1#	IN_{t5V}	VCC	Data Set Ready. An active low signal indicates the modem or data set is ready to establish a communication link and transfer data to the UART.
124	SOUT1/JP3	$I/O_{8t\text{-}u47,5V}$	VCC	UART 1 Serial Output. Used to transmit serial data out to the communication link.(Internal 47k pulled high and disable after power on strapping) Power on strapping: Default is high. Flash Rom Interface Address Segment 3 Enable (FFF80000h-FFFBFFFFh).
125	SIN1	IN_{t5V}	VCC	Serial Input. Used to receive serial data through the communication link.
126	DCD2#	IN_{t5V}	VCC	Data Carrier Detect. An active low signal indicates the modem or data set has detected a data carrier.
127	RI2#	IN_{t5V}	VCC	Ring Indicator. An active low signal indicates that a ring signal is being received from the modem or data set.
128	CTS2#	IN_{t5V}	VCC	Clear To Send is the modem control input.
1	DTR2#/JP4	$I/O_{8t\text{-}u47,5V}$	VCC	UART 2 Data Terminal Ready. An active low signal informs the modem or data set that controller is ready to communicate.(Internal 47k pulled high and disable after power on strapping) Power on strapping : 1 PWM Mode (Default) 0 Linear Mode
2	RTS2#/JP6	$I/O_{8t\text{-}u47,5V}$	VCC	UART 2 Request To Send. An active low signal informs the modem or data set that the controller is ready to send data.(Internal 47k pulled high and disable after power on strapping) Power on strapping : 1 XBUS Interface (Default) 0 Reserved.
3	DSR2#	IN_{t5V}	VCC	Data Set Ready. An active low signal indicates the modem or data set is ready to establish a communication link and transfer data to the UART.
5	SOUT2/JP5	$I/O_{8t\text{-}u47,5V}$	VCC	UART 2 Serial Output. Used to transmit serial data out to the communication link.(Internal 47k pulled high and disable after power on strapping) Power on strapping : 1 Configuration register:4E (Default) 0 Configuration register:2E
6	SIN2	IN_{t5V}	VCC	Serial Input. Used to receive serial data through the communication link.

5.5 IEEE 1284 Parallel Port

Pin No.	Pin Name	Type	PWR	Description
100	SLCT	IN_{ts5V}	VCC	An active high input on this pin indicates that the printer is selected. Refer to the description of the parallel port for definition of this pin in ECP and EPP mode.
101	PE	IN_{ts5V}	VCC	An active high input on this pin indicates that the printer has detected the end of the paper. Refer to the description of the parallel port for the definition of this pin in ECP and EPP mode.
102	BUSY	IN_{ts5V}	VCC	An active high input indicates that the printer is not ready to receive data. Refer to the description of the parallel port for definition of this pin in ECP and EPP mode.
103	ACK#	IN_{ts5V}	VCC	An active low input on this pin indicates that the printer has received data and is ready to accept more data. Refer to the description of the parallel port for the definition of this pin in ECP and EPP mode.
104	SLIN#	I/OD_{12ts5V}	VCC	Output line for detection of printer selection. Refer to the description of the parallel port for the definition of this pin in ECP and EPP mode.
105	INIT#	I/OD_{12ts5V}	VCC	Output line for the printer initialization. Refer to the description of the parallel port for the definition of this pin in ECP and EPP mode.
106	ERR#	IN_{ts5V}	VCC	An active low input on this pin indicates that the printer has encountered an error condition. Refer to the description of the parallel port for the definition of this pin in ECP and EPP mode.
107	AFD#	I/OD_{12ts5V}	VCC	An active low output from this pin causes the printer to auto feed a line after a line is printed. Refer to the description of the parallel port for the definition of this pin in ECP and EPP mode.
108	STB#	I/OD_{12ts5V}	VCC	An active low output is used to latch the parallel data into the printer. Refer to the description of the parallel port for the definition of this pin in ECP and EPP mode.
109	PD0	I/O_{12ts5V}	VCC	Parallel port data bus bit 0. Refer to the description of the parallel port for the definition of this pin in ECP and EPP mode.
110	PD1	I/O_{12ts5V}	VCC	Parallel port data bus bit 1.
111	PD2	I/O_{12ts5V}	VCC	Parallel port data bus bit 2.
112	PD3	I/O_{12ts5V}	VCC	Parallel port data bus bit 3.
113	PD4	I/O_{12ts5V}	VCC	Parallel port data bus bit 4.
114	PD5	I/O_{12ts5V}	VCC	Parallel port data bus bit 5.
115	PD6	I/O_{12ts5V}	VCC	Parallel port data bus bit 6.
116	PD7	I/O_{12ts5V}	VCC	Parallel port data bus bit 7.

5.6 H/W Monitor

Pin No.	Pin Name	Type	PWR	Description
91-98	VIN8~VIN1	AIN	VCC	Voltage input 8 ~ 1.
73-75	FAN_TAC1~ FAN_TAC3	IN_{ts}	VCC	Fan tachometer inputs.

78-80	FAN_CTL1~ FAN_CTL3	O_{12}	VCC	Fan control outputs. These pins provide PWM duty-cycle output or a voltage output.
87-89	D3~ D1	AIN	VCC	CPU thermal diode/transistor temperature sensor input.
90	VREF	AOUT	VCC	Voltage sensor output.
81	PME#	OD_{12}	VCC	Generated PME event.
85	OVT#	OD_{12}	VCC	Generated over temperature event.
49-52	GP00~ GP03/ Voltage_fault1~4	I/OOD_{12t}	VCC	General purpose IO. 1. Support Level and Pulse mode output. 2. Open drain and drive select. 3. Without input de-bounce. Voltage fault indication for VIN abnormal event. VIN1 → Voltage_fault1 VIN2 → Voltage_fault2 VIN3 → Voltage_fault3 VIN4 → Voltage_fault4
53-55	GP04~ GP06/ VIN7_ID0~2	I/OOD_{12t}	VCC	General purpose IO. 1. Support Level and Pulse mode output. 2. Open drain and drive select 3. Without input de-bounce. Voltage fault indication is for VIN7 abnormal event ID.

5.7 Flash ROM Interface and GPIO

Pin No.	Pin Name	Type	PWR	Description
7-14	FD0~ FD7	I/O_{8t}	VCC	Flash ROM interface data [0:7].
16-23	FA0~ FA7/ GP10~ GP17	O_8 I/O_{8t}	VCC	The first functions of these pins are the Flash ROM interface address [0:7]. The second Functions of these pins are GPIO [10:17].
24-25	FA8~ FA9	O_8	VCC	Flash ROM interface address [8:9].
26-33	FA10~ FA17/ GP20~ GP27	O_8 I/O_{8t}	VCC	The first functions of these pins are the Flash ROM interface address [10:17]. The second Functions of these pins are GPIO [20:27].
34	FRD#	O_8	VCC	Flash ROM interface Read Strobe#.
47	FCS#	O_8	VCC	Flash ROM interface Chip Select#.
48	FWE#	O_8	VCC	Flash ROM interface Write Enable#.
59	FA18	O_8	VCC	Flash ROM interface address18.
56	GP07/FANCTL	I/OOD_{12t}	VCC	General purpose IO. 1. Support Level and Pulse mode output. 2. Open drain and drive select 3. Without input de-bounce. Fan 1 control output for Intel 4-pin Fan. All the registers are as same as FANCTL1.

6. Function Description

6.1 Power on Strapping Options

The F71805 provides four pins for power on hardware strapping to select functions. There is a form to describe how to set the functions you want.

Pin No.	Symbol	Value	Description
1	JP4	1	Fan control mode: PWM mode. (Default)
		0	Fan control mode: Linear mode.
2	JP6	1	ISA ROM Interface enable (Default)
		0	Reserved
5	JP5	1	Chip selection in configuration 4E. (Default)
		0	Chip selection in configuration 2E.
121	JP1	1	Flash Rom Interface Address Segment 1 Enable (Default) (FFFC0000h-FFFFFFFFh, 000E0000h-000FFFFFh).
		0	Disable.
122	JP2	1	Flash Rom Interface Address Segment 2 Enable (Default) (FFEE0000h-FFEFFFFFh).
		0	Disable.
124	JP3	1	Flash Rom Interface Address Segment 3 Enable (Default) (FFF80000h-FFFBFFFFh).
		0	Disable.

6.2 Hardware Monitor

6.2.1 Analog Input

The F71805 provides 8 pins (8-bit) ADC voltage inputs. These input voltages should be positive and is limited at range of 0v to 2.048V. The minimum resolution (1-LSB) is 8mV. If the voltage is over this range, the divider resistor must be added and the divided voltage is also in the range of 0V to 2.048V.

The maximum input voltage of the analog pin is 2.048V because the 8-bit ADC has a 8mv LSB. Really, the application of the PC monitoring would most often be connected to power suppliers. The voltage range of 0V to 2.048V can be connected to these analog inputs. The 3.3V and VSB5V should be reduced a factor with external resistors so as to obtain the input range..

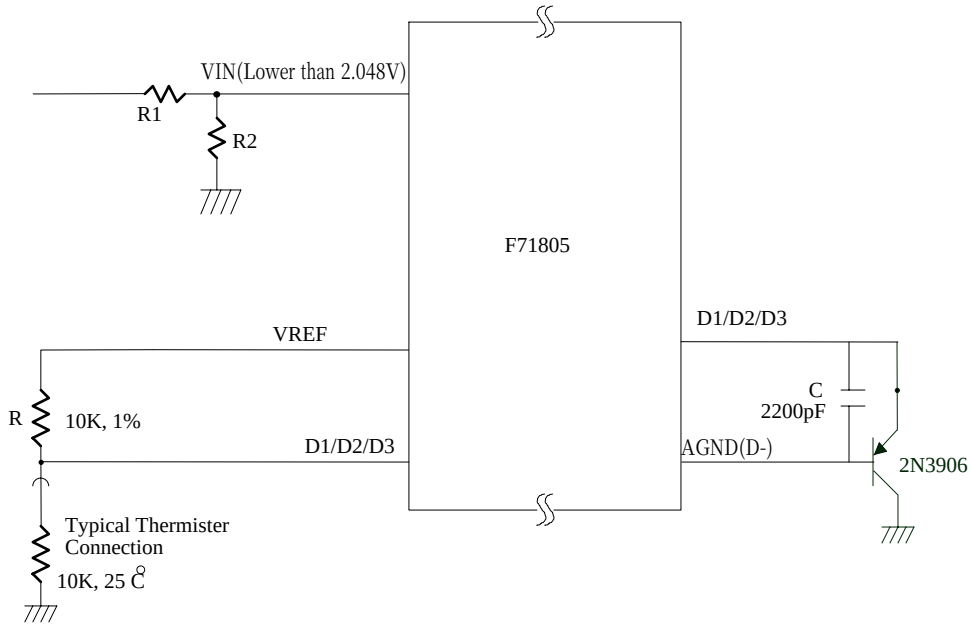
There are 8 voltage inputs in the F71805 and the voltage divided formula is shown as follows:

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

For instance, where V_{+12V} is the analog input voltage.

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.



6.2.2 Temperature Monitoring and Offset

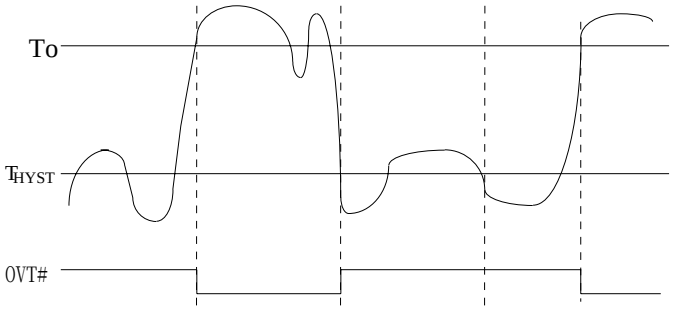
The F71805 can be measured from 0°C to 140°C. The status depends on different situation. As connected to a BJT thermal diode, detected temperature ranges from 0°C to 140°C without considering the OFFSET effect. As connected to a thermistor, detected temperature ranges from 0°C to 127°C without considering the OFFSET effect. The temperature format is as the following table:

Temperature (High Byte)	Digital Output
0°C	0000 0000
1°C	0000 0001
25°C	0001 1001
50°C	0011 0010
75°C	0100 1011
90°C	0101 1010
100°C	0110 0100
140°C	1000 1100

The F71805 provides offset register for each temperature. The offset value is an 7-bit, 2's complement value. The reading temperature value will be the result of the offset value added to the monitored value. The offset format is as the following table:

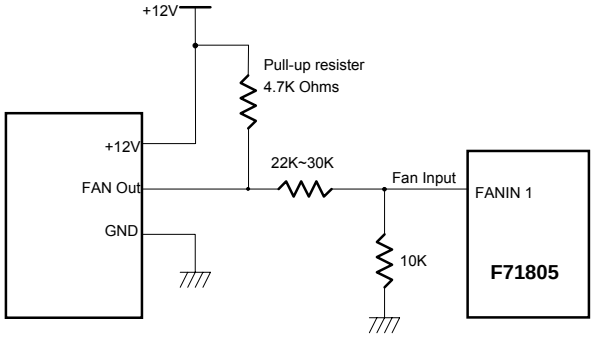
Offset Value	High Byte
63°C	0011 1111
2°C	0000 0010
1°C	0000 0001
0°C	0000 0000
-1°C	0100 0001
-2°C	0100 0010
-64°C	0100 0000

The F71805 can provide two external thermal sensors to detect temperature. When monitored temperature exceeds the over-temperature threshold value, OVT# (pin85) will be asserted until the temperature goes below the hysteresis temperature.

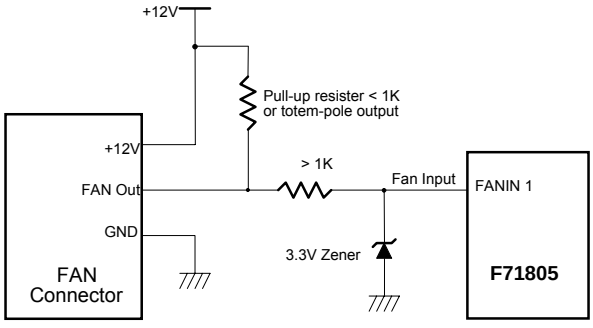


6.2.3 Fan speed count

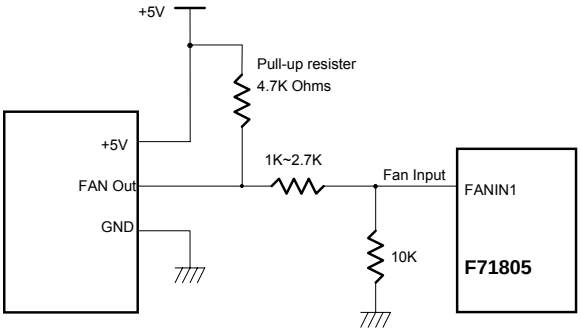
Inputs are provided by the signals from fans equipped with tachometer outputs. The level of these signals should be set to TTL level, and maximum input voltage cannot be over VCC. If the input signals from the tachometer outputs are over the VCC, the external trimming circuit should be added to reduce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



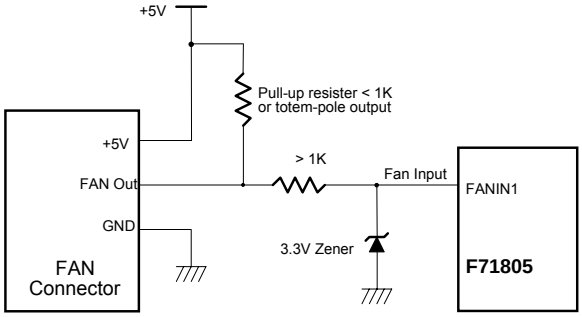
Fan with Tach Pull-Up to +12V, or Totern-Pole Output and Register Attenuator



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



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



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.

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

6.2.4 Fan speed control

The F71805 provides 2 fan speed control methods: 1. Linear FAN Control 2. PWM Duty Cycle

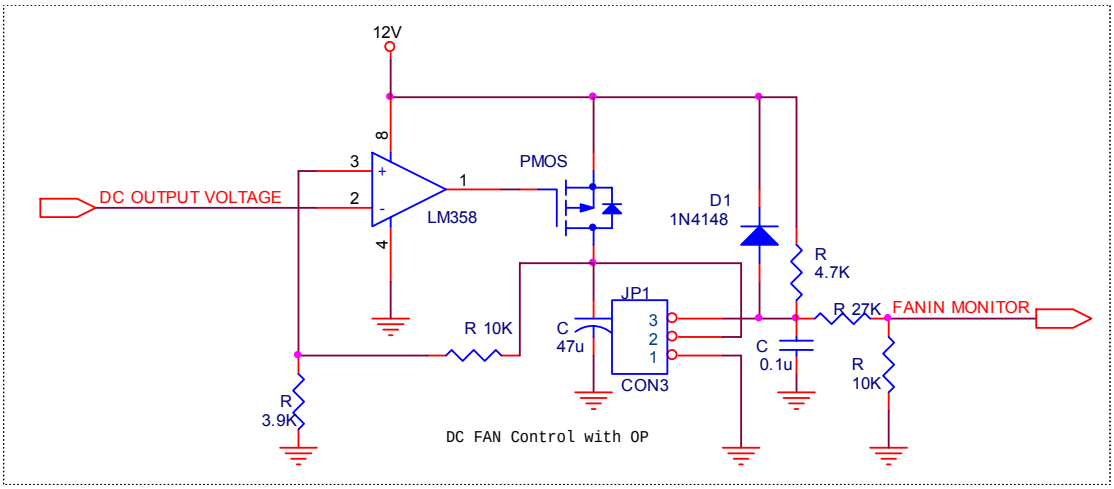
Linear Fan Control

The range of DC output is 0~3.3V, controlled by 8-bit register (CR6Bh for FAN1, CR7Bh for FAN2 and CR8Bh for FAN3). 1 LSB is about 0.013V. The output DC voltage is amplified by external OP circuit, thus to reach maximum FAN OPERATION VOLTAGE, 12V.

The output voltage will be given as followed:

$$\text{Output_voltage (V)} = 3.3 \times \frac{\text{Programmed 8 - bit Register Value}}{255}$$

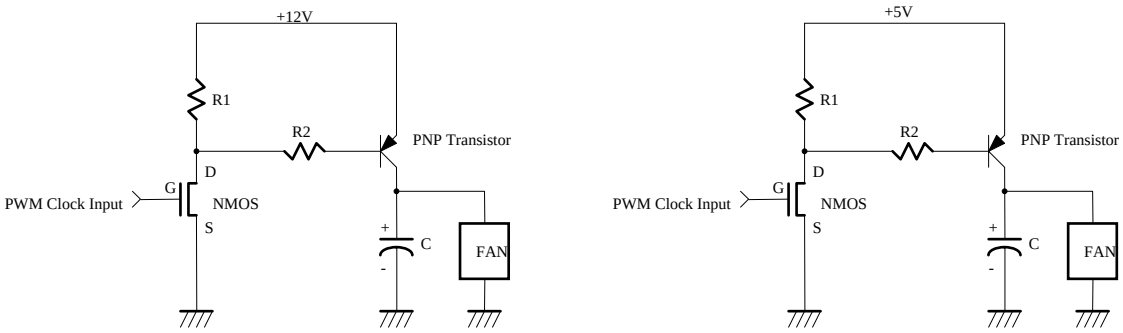
And the suggested application circuit for linear fac control would be:



PWM duty Fan Control

The duty cycle of PWM can be programmed by a 8-bit register which are defined in the CR6Bh, CR7Bh and CR8Bh. 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.

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



6.2.5 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:

Fan Speed mode

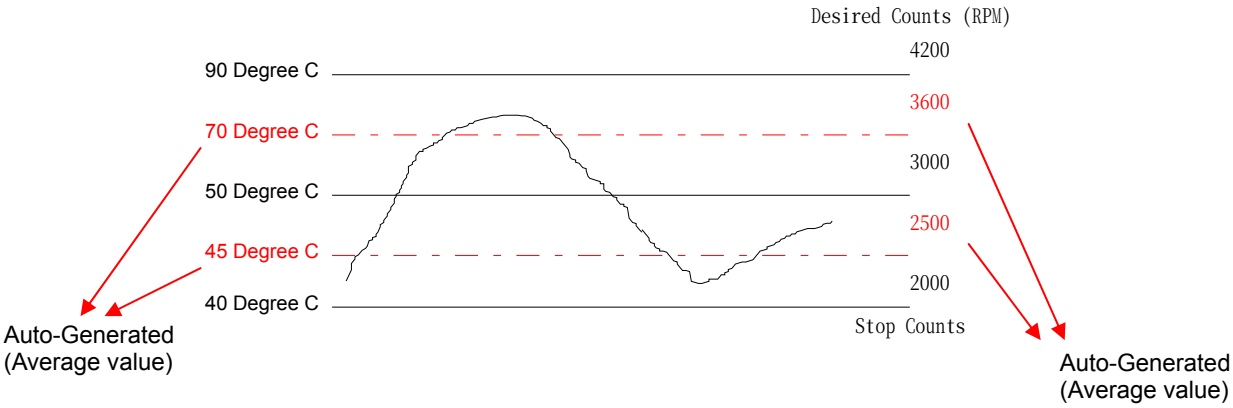
Fan speed mode is an intelligent method according to expected fan speed pre-setting by BIOS. In the beginning, fan speed will be operated at full speed and the F71805 will get the full speed count value. After that, the fan speed will automatically rotate according to the expected fan speed setting by BIOS.

For instance, the register CR69h and CR6Ah are used for this mode of FAN1.

Temperature mode

At this mode, F71805 provides the clever system to automatically control fan speed related to temperature system. The F71805 can provide three temperature boundaries and three intervals for user setting, and each interval has its related fan speed count. All these values should be set by BIOS first. In the F71805 design, the F71805 will auto-generate temperature boundaries (average value) between those boundaries that user setting, and it will auto-produce interval fan speed count (average value) between users setting value.

If the temperature value is set to 40, 50 and 90°C, it will auto-generate two temperature boundaries value of 45°C (This value is calculated automatically by hardware design of the F71805. (50+40)/2 =45) and 70°C. The same way, the related desired fan speed counts for each interval are 4200RPM, 3600RPM, 3000RPM, 2500RPM, 2000RPM and Stop Counts. When the temperature is within 50~70°C, the fan speed counts will be 3000RPM (Registers CRA4h~CRA9h, CRB4h~CRB9h and CRC4h~CRC9h). The F71805 will auto-adjust PWMOUT (PWM_DUTY) 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 F71805 will take charge of all the fan speed control and need no software support.



PWMOUT Duty-cycle operating process

In both “FAN SPEED” and “TEMPERATURE” modes, F71805 adjust PWMOUT (PWM_DUTY1 (CR6B) of Fan1, PWM_DUTY2 (CR7B) of Fan2, PWM_DUTY3 (CR8B) of Fan3) 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 (PWM_DUTY)will be set to 00h to turn off fan.

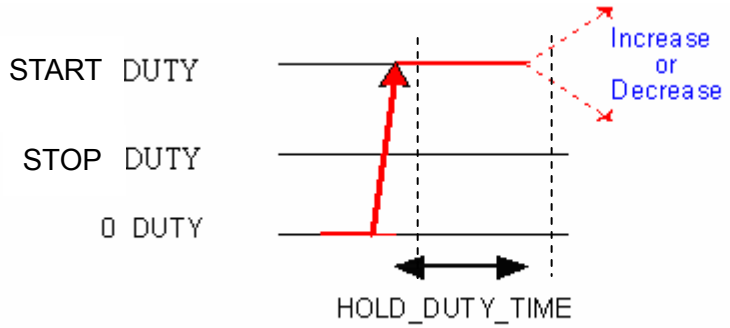
(2). When expected count is 0000h, PWMOUT duty-cycle (PWM_DUTY) will be set to FFh to turn on fan with full speed.

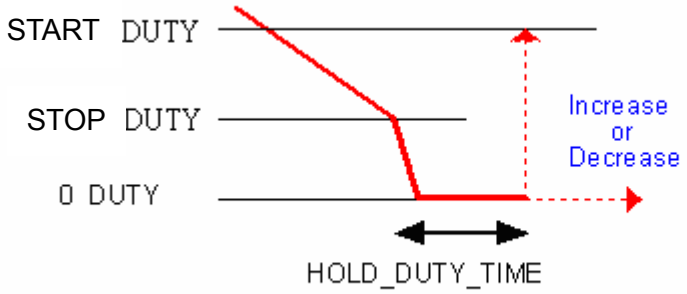
(3). If both (1) and (2) are not true and KEEP_STOP (see INDEX 60h) is set to 0:

(a). When PWMOUT duty-cycle decrease to STOP_DUTY(≠ 00h), obviously the duty-cycle will decrease to 00h next, F71805 will keep duty-cycle at 00h 3 seconds[1]. After that, F71805 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, F71805 will ignore it.

(b). When PWMOUT duty-cycle increase from 00h to START_DUTY(≠ 00h), F71805 also will keep duty-cycle at START_DUTY 3 seconds[1]. After that, F71805 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, F71805 will ignore it.

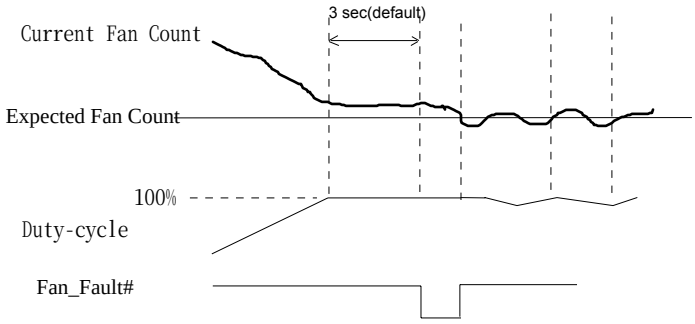
Note 1: The period of HOLD_DUTY_TIME can be programmed at INDEX 67h of FAN1.





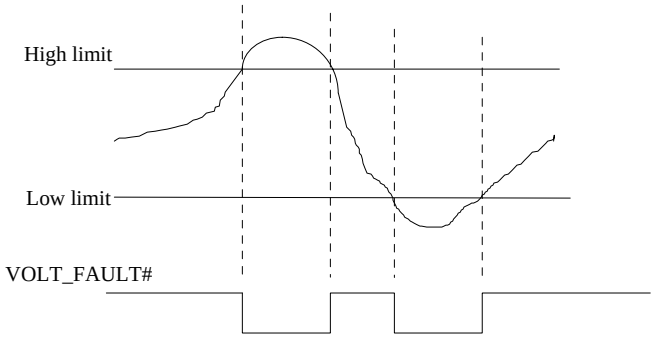
6.2.6 FAN_FAULT#

Fan_Fault will be asserted (PME# Pin 81) when the fan speed doesn't meet the expected fan speed within a programmable period (default is 3 seconds) or when PWMOUT duty-cycle is 100%.



6.2.7 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.



6.3 FDC

The Floppy Disk Controller provides the interface between a host processor and one floppy disk drives. It integrates a controller and a digital data separator with write pre-compensation, data rate selection logic, microprocessor interface, and a set of registers. The FDC supports data transfer rates of 250 Kbps, 300 Kbps, 500 Kbps, and 1 Mbps. It operates in PC/AT mode and supports 3-mode type drives.

The FDC configuration is handled by software and a set of Configuration registers. Status, Data, and Control registers facilitate the interface between the host microprocessor and the disk drive, providing information about the condition and/or state of the FDC. These configuration registers can select the data rate, enable interrupts, drives, and DMA modes, and indicate errors in the data or operation of the FDC/FDD. The controller manages data transfers using a set of data transfer and control commands. These commands are handled in three phases: Command, Execution, and Result. Not all commands utilize all these three phases.

6.4 UART

The UARTs are used to convert data between parallel format and serial format. They convert parallel data into serial format on transmission and serial format into parallel data on receiver side. The serial format is formed by one start bit, followed by five to eight data bits, a parity bit if programmed and one (1.5 or 2) stop bits. The UARTs include complete modem control capability and an interrupt system that may be software trailed to the computing time required to handle the communication link. They have FIFO mode to reduce the number of interrupts presented to the host. Both receiver and transmitter have a 16-byte FIFO.

6.5 Parallel Port

The parallel port in F71805 supports an IBM XT/AT compatible parallel port (SPP), bi-directional paralle port (BPP), Enhanced Parallel Port (EPP), Extended Capabilities Parallel Port (ECP) mode. Refer to the configuration registers for more information on selecting the mode of operation.

7. Register Description

7.1 Global Control Registers

The configuration register is used to control the behavior of the corresponding devices. To configure the register, using the index port to select the index and then writing data port to alter the parameters. The default index port and data port are 0x4E and 0x4F respectively. Pull down the SOUT2/JP5 pin to change the default value to 0x2E/0x2F. To enable configuration, the entry key 0x87 must be written to the index port. To disable configuration, write exit key 0xAA to the index port. Following is a example to enable configuration and disable configuration by using debug.

```
-o 4e 87
-o 4e 87          ( enable configuration )
-o 4e aa          ( disable configuration )
```

7.1.1 Software Reset Register — Index 02h

Bit	Name	R/W	Default	Description
7-1	Reserved	-	-	Reserved.
0	SOFT_RST	R/W	0	Write 1 to reset the register and device powered by VDD (VCC).

7.1.2 Logic Device Number Register — Index 07h

Bit	Name	R/W	Default	Description
7-0	LDN	R/W	00h	00h: Select FDC device configuration registers. 01h: Select UART 1 device configuration registers. 02h: Select UART 2 device configuration registers. 03h: Select Parallel Port device configuration registers. 04h: Select Hardware Monitor device configuration registers. 06h: Select GPIO device configuration registers. 0ah: Select PME device configuration registers. Otherwise: reserved.

7.1.3 Chip ID Register — Index 20h

Bit	Name	R/W	Default	Description
7-0	CHIP_ID1	R	04h	Chip ID 1 of F71805.

7.1.4 Chip ID Register — Index 21h

Bit	Name	R/W	Default	Description
7-0	CHIP_ID2	R	06h	Chip ID2 of F71805.

7.1.5 Vendor ID Register — Index 23h

Bit	Name	R/W	Default	Description
7-0	VENDOR_ID1	R	19h	Vendor ID 1 of Fintek devices.

7.1.6 Vendor ID Register — Index 24h

Bit	Name	R/W	Default	Description
7-0	VENDOR_ID2	R	34h	Vendor ID 2 of Fintek devices.

7.1.7 Software Power Down Register — Index 25h

Bit	Name	R/W	Default	Description

7-6	Reserved	-	-	Reserved
4	SOFTPD_HM	R/W	0	Power down the Hardware Monitor device. This will stop the Hardware Monitor clock.
3	SOFTPD_PRT	R/W	0	Power down the Parallel Port device. This will stop the Parallel Port clock.
2	SOFTPD_UR2	R/W	0	Power down the UART 2 device. This will stop the UART 2 clock.
1	SOFTPD_UR1	R/W	0	Power down the UART 1 device. This will stop the UART 1 clock.
0	SOFTPD_FDC	R/W	0	Power down the FDC device. This will stop the FDC clock.

7.1.8 UART IRQ Sharing Register — Index 26h

Bit	Name	R/W	Default	Description
7-2	Reserved	-	-	Reserved.
1	IRQ_MODE	R/W	0	0: PCI IRQ sharing mode (low level). 1: ISA IRQ sharing mode (low pulse).
0	IRQ_SHAR	R/W	0	0: disable IRQ sharing of two UART devices. 1: enable IRQ sharing of two UART devices.

7.1.9 Power On Trap Status Register — Index 27h

Bit	Name	R/W	Default	Description
7-6	Reserved	-	-	Reserved.
5	PORT4E_EN	R/W	1	0: Configuration Register port is 2E/2F. 1: Configuration Register port is 4E/4F.
4	XBUS_EN	R/W	1	0: disable XBUS. FA17/GP27 ~ FA10/GP20 function as GP2. FA7/GP17 ~ FA0/GP10 function as GP1. 1: enable XBUS.
3	SEG_000E_EN	R/W	1	0: disable segment 000E0000h-000EFFFFh. 1: enable segment 000E000h-000EFFFFh.
2	SEG_FFFF_EN	R/W	1	0: disable segment FFFFFFFFh-FFFC0000h. 1: enable segment FFFFFFFFh-FFFC0000h.
1	SEG_FFEF_EN	R/W	1	0: disable segment FFEFFFFFh-FFEE0000h. 1: enable segment FFEFFFFFh-FFEE0000h.
0	SEG_FFF8_EN	R/W	1	0: disable segment FFFBFFFFh-FFF80000h. 1: enable segment FFFBFFFFh-FFF80000h.

7.1.10 Flash Control Register — Index 28h

Bit	Name	R/W	Default	Description
7	FLASH_WR_EN	R/W	0	0: disable flash write. 1: enable flash write.
6-5	Reserved	-	-	Reserved.

4-0	WAIT_TIMES	R/W	8h	Adjust the cycles of the FCS# to improve the performance of the XBUS. The length of FCS# is from 7 LCLK cycles (WAIT_TIMES == 00h) to 38 LCLK cycles (WAIT_TIMES == 1fh).

7.1.11 Voltage Fault Enable Register — Index 29h

Bit	Name	R/W	Default	Description
7	FANCTL_GPEN	R/W	0	0: the function of GP07 is GP07. 1: the function of GP07 is FANCTL.
6	VIN7_ID2_EN	R/W	0	0: the function of GP06/VIN7_ID2 is GP06. 1: the function of GP06/VIN7_ID2 is VIN7_ID2.
5	VIN7_ID1_EN	R/W	0	0: the function of GP05/VIN7_ID1 is GP05. 1: the function of GP05/VIN7_ID1 is VIN7_ID1.
4	VIN7_ID0_EN	R/W	0	0: the function of GP04/VIN7_ID0 is GP04. 1: the function of GP04/VIN7_ID0 is VIN7_ID0.
3	VOLT_FAULT4_EN	R/W	0	0: the function of GP03/Voltage_fault4 is GP03. 1: the function of GP03/Voltage_fault4 is Voltage_fault4.
2	VOLT_FAULT3_EN	R/W	0	0: the function of GP02/Voltage_fault3 is GP02. 1: the function of GP02/Voltage_fault3 is Voltage_fault3.
1	VOLT_FAULT2_EN	R/W	0	0: the function of GP01/Voltage_fault2 is GP01. 1: the function of GP01/Voltage_fault2 is Voltage_fault2.
0	VOLT_FAULT1_EN	R/W	0	0: the function of GP00/Voltage_fault1 is GP00. 1: the function of GP00/Voltage_fault1 is Voltage_fault1.

7.2 FDC Register

7.2.1 Logic Device Number Register

Logic Device Number Register — Index 07h

Bit	Name	R/W	Default	Description
7-0	LDN	R/W	00h	00h: Select FDC device configuration registers. 01h: Select UART 1 device configuration registers. 02h: Select UART 2 device configuration registers. 03h: Select Parallel Port device configuration registers. 04h: Select Hardware Monitor device configuration registers. 06h: Select GPIO device configuration registers. 0ah: Select PME device configuration registers. Otherwise: reserved.

7.2.2 FDC Configuration Registers

FDC Device Enable Register — Index 30h

Bit	Name	R/W	Default	Description
7-1	Reserved	-	-	Reserved
0	FDC_EN	R/W	1	0: disable FDC. 1: enable FDC.

Base Address High Register — Index 60h

Bit	Name	R/W	Default	Description
7-0	BASE_ADDR_HI	R/W	03h	The MSB of FDC base address.

Base Address Low Register — Index 61h

Bit	Name	R/W	Default	Description
7-0	BASE_ADDR_LO	R/W	F0h	The LSB of FDC base address.

IRQ Channel Select Register — Index 70h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	Reserved.
3-0	SELFDCIRQ	R/W	06h	Select the IRQ channel for FDC.

DMA Channel Select Register — Index 74h

Bit	Name	R/W	Default	Description
7-3	Reserved	-	-	Reserved.
2-0	SELFDCDMA	R/W	010	Select the DAM channel for FDC.

FDD Mode Register — Index F0h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	Reserved.

3-2	IF_MODE	R/W	11	00: Model 30 mode. 01: PS/2 mode. 10: Reserved. 11: AT mode (default).
1	FDMAMODE	R/W	1	0: enable burst mode. 1: non-busrt mode (default).
0	EN3MODE	R/W	0	0: normal floppy mode (default). 1: enhanced 3-mode FDD.

FDD Drive Type Register — Index F2h

Bit	Name	R/W	Default	Description
7-2	Reserved	-	-	Reserved.
1-0	FDD_TYPE	R/W	11	FDD drive type.

FDD Selection Register — Index F4h

Bit	Name	R/W	Default	Description
7-5	Reserved	-	-	Reserved.
4-3	FDD_DRT	R/W	00	Data rate table select, refer to table A. 00: select regular drives and 2.88 format. 01: 3-mode drive. 10: 2 mega tape. 11: reserved.
2	Reserved	-	-	Reserved.
1-0	FDD_DT	R/W	00	Drive type select, refer to table B.

TABLE A

Data Rate Table Select		Data Rate		Selected Data Rate		DENSEL
FDD_DRT[1]	FDD_DRT[0]	DATARATE1	DATARATE0	MFM	FM	
0	0	0	0	500K	250K	1
		0	1	300K	150K	0
		1	0	250K	125K	0
		1	1	1Meg	---	1
0	1	0	0	500K	250K	1

		0	1	500K	250K	0
		1	0	250K	125K	0
		1	1	1Meg	---	1
		0	0	500K	250K	1
1	0	0	1	2Meg	---	0
		1	0	250K	125K	0
		1	1	1Meg	---	1

TABLE B

Drive Type		DRVDEN0	Remark
FDD_DT1	FDD_DT0		
	0	DENSEL	4/2/1 MB 3.5”
0			2/1 MB 5.25”
			1/1.6/1 MB 3.5” (3-Mode)
0	1	DATARATE1	
1	0	DENSEL#	
1	1	DATARATE0	

7.2.3 Device Registers

7.2.3.1 Status Register A (PS/2 mode) — Base + 0

Bit	Name	R/W	Default	Description
7	INTPEND	R	0	This bit indicates the state of the interrupt output.
6	DRV2_N	R	-	0: a second drive has been installed. 1: a second drive has not been installed.
5	STEP	R	0	This bit indicates the complement of STEP# disk interface output.
4	TRK0_N	R	-	This bit indicates the state of TRK0# disk interface input.
3	HDSEL	R	0	This bit indicates the complement of HDSEL# disk interface output. 0: side 0. 1: side 1.
2	INDEX_N	R	-	This bit indicates the state of INDEX# disk interface input.
1	WPT_N	R	-	This bit indicates the state of WPT# disk interface input. 0: disk is write-protected. 1: disk is not write-protected.
0	DIR	R	0	This bit indicates the complement of DIR# disk interface output.

7.2.3.2 Status Register A (Model 30 mode) — Base + 0

Bit	Name	R/W	Default	Description

7	INTPEND	R	0	This bit indicates the state of the interrupt output.
6	DRQ	R	0	This bit indicates the state of the DRQ signal.
5	STEP_FF	R	0	This bit indicates the complement of latched STEP# disk interface output.
4	TRK0	R	-	This bit indicates the complement of TRK0# disk interface input.
3	HDSEL_N	R	1	This bit indicates the state of HDSEL# disk interface output. 0: side 0. 1: side 1.
2	INDEX	R	-	This bit indicates the complement of INDEX# disk interface input.
1	WPT	R	-	This bit indicates the complement of WPT# disk interface input. 0: disk is write-protected. 1: disk is not write-protected.
0	DIR_N	R	1	This bit indicates the state of DIR# disk interface output. 0: head moves in inward direction. 1: head moves in outward direction.

7.2.3.3 Status Register B (PS/2 Mode) — Base + 1

Bit	Name	R/W	Default	Description
7-6	Reserved	R	-	Reserved. Return 11b when read.
5	DR0	R	0	Drive select 0. This bit reflects the bit 0 of Digital Output Register.
4	WDATA	R	0	This bit changes state at every rising edge of WDATA#.
3	RDATA	R	0	This bit changes state at every rising edge of RDATA#.
2	WGATE	R	0	This bit indicates the complement of WGATE# disk interface output.
1	MOTEN1	R	0	This bit indicates the complement of MOB# disk interface output. Not support in this design.
0	MOTEN0	R	0	This bit indicates the complement of MOA# disk interface output.

7.2.3.4 Status Register B (Model 30 Mode) — Base + 1

Bit	Name	R/W	Default	Description
7	DRV2_N	R	-	0: a second drive has been installed. 1: a second drive has not been installed.
6	DSB_N	R	1	This bit indicates the state of DRVB# disk interface output. Not support in this design.
5	DSA_N	R	1	This bit indicates the state of DRVA# disk interface output.
4	WDATA_FF	R	0	This bit is latched at the rising edge of WDATA# and is cleared by a read from the Digital Input Register.
3	RDATA_FF	R	0	This bit is latched at the rising edge of RDATA# and is cleared by a read form the Digital Input Register.
2	WGATE_FF	R	0	This bit is latched at the falling edge of WGATE# and is cleared by a read from the Digital Input Register.
1	DSD_N	R	1	This bit indicates the complement of DRVD# disk interface output. Not support in this design.
0	DSC_N	R	1	This bit indicates the complement of DRVC# disk interface output. Not support in this design.

7.2.3.5 Digital Output Register — Base + 2

Bit	Name	R/W	Default	Description
7	MOTEN3	R	0	Motor enable 3. Not support in this design.
6	MOTEN2	R	0	Motor enable 2. Not support in this design.
5	MOTEN1	R/W	0	Motor enable 1. Used to control MOB#. MOB# is not support in this design.
4	MOTEN0	R/W	0	Motor enable 0. Used to control MOA#.
3	DAMEN	R/W	0	DMA enable. This bit has two mode of operation. PC-AT and Model 30 mode: write 1 will enable DMA and IRQ, write 0 will disable DMA and IRQ. PS/2 mode: This bit is reserved. DMA and IRQ are always enabled in PS/2 mode.
2	RESET	R	0	Write 0 to this bit will reset the controller. I will remain in reset condition until a 1 is written.
1	DSD_N	R	1	This bit indicates the complement of DRVD# disk interface output. Not support in this design.
0	DSC_N	R	1	This bit indicates the complement of DRVC# disk interface output. Not support in this design.

7.2.3.6 Tape Drive Register — Base + 3

Bit	Name	R/W	Default	Description
7-6	Reserved	R	-	Reserved. Return 00b when read.
5-4	TYPEID	R	11	Reserved in normal function, return 11b when read. If 3 mode FDD function is enabled. These bits indicate the drive type ID.
3-2	Reserved	R	11	Reserved. Return 11b when read in normal function. Return 00b when read in 3 mode FDD function.
1-0	TAPESEL	R/W	00	These bits assign a logical drive number to be a tape drive.

7.2.3.7 Main Status Register — Base + 4

Bit	Name	R/W	Default	Description
7	RQM	R	0	Request for Master indicates that the controller is ready to send or receive data from the uP through the FIFO.
6	DIO	R	0	Data I/O (direction): 0: the controller is expecting a byte to be written to the Data Register. 1: the controller is expecting a byte to be read from the Data Register.
5	NON_DMA	R	0	Non DMA Mode: 0: the controller is in DAM mode. 1: the controller is interrupt or software polling mode.
4	FDC_BUSY	R	0	This bit indicate that a read or write command is in process.
3	DRV3_BUSY	R	0	FDD number 3 is in seek or calibration condition. FDD number 3 is not support in this design.
2	DRV2_BUSY	R	0	FDD number 2 is in seek or calibration condition. FDD number 2 is not support in this design.

1	DRV1_BUSY	R	0	FDD number 1 is in seek or calibration condition. FDD number 1 is not support in this design.
0	DRV0_BUSY	R	0	FDD number 0 is in seek or calibration condition.

7.2.3.8 Data Rate Select Register — Base + 4

Bit	Name	R/W	Default	Description
7	SOFTRST	W	0	A 1 written to this bit will software reset the controller. Auto clear after reset.
6	PWRDOWN	W	0	A 1 to this bit will put the controller into low power mode which will turn off the oscillator and data separator circuits.
5	Reserved	-	-	Return 0 when read.
4-2	PRECOMP	W	000	Select the value of write precompensation: 250K-1Mbps 2Mbps 000: default delays default delays 001: 41.67ns 20.8ns 010: 83.34ns 41.17ns 011: 125.00ns 62.5ns 100: 166.67ns 83.3ns 101: 208.33ns 104.2ns 110: 250.00ns 125.00ns 111: 0.00ns (disabled) 0.00ns (disabled) The default value of corresponding data rate: 250Kbps: 125ns 300Kbps: 125ns 500Kbps: 125ns 1Mbps: 41.67ns 2Mbps: 20.8ns
1-0	DRATE	W	10	Data rate select: MFM FM 00: 500Kbps 250Kbps 01: 300Kbps 150Kbps 10: 250Kbps 125Kbps 11: 1Mbps illegal

7.2.3.9 Data (FIFO) Register — Base + 5

Bit	Name	R/W	Default	Description
7-0	DATA	R/W	00h	The FIFO is used to transfer all commands, data and status between controller and the system. The Data Register consists of four status registers in a stack with only one register presented to the data bus at a time. The FIFO is default disabled and could be enabled via the CONFIGURE command.

Status Registers 0

Bit	Name	R/W	Default	Description

7-6	IC	R	-	Interrupt code : 00: Normal termination of command. 01: Abnormal termination of command. 10: Invalid command. 11: Abnormal termination caused by poling.
5	SE	R	-	Seek end. Set when a SEEK or RECALIBRATE or a READ or WRITE with implied seek command is completed.
4	EC	R	-	Equipment check. 0: No error 1: When a fault signal is received form the FDD or the TRK0# signal fails to occur after 77 step pulses.
3	NR	R	-	Not ready. 0: Drive is ready 1: Drive is not ready.
2	HD	R	-	Head address. The current head address.
1-0	DS	R	-	Drive select. 00: Drive A selected. 01: Drive B selected. 10: Drive C selected. 11: Drive D selected.

Status Registers 1

Bit	Name	R/W	Default	Description
7	EN	R	-	End of Track. Set when the FDC tries to access a sector beyond the final sector of a cylinder.
6	DE	R	-	Data Error. The FDC detect a CRC error in either the ID field or the data field of a sector.
4	OR	R	-	Overrun/Underrun. Set when the FDC is not serviced by the host system within a certain time interval during data transfer.
3	Reserved	-	-	Unused. This bit is always “0”
2	ND	R	-	No Data. Set when the following conditions occurred: 1. The specified sector is not found during any read command. 2. The ID field cannot be read without errors during a READ ID command. 3. The proper sector sequence cannot be found during a READ TRACK command.
1	NW	R	-	No Writable Set when WPT# is active during execution of write commands.

0	MA	R	-	Missing Address Mark. Set when the following conditions occurred: 1. Cannot detect an ID address mark at the specified track after encountering the index pulse form the INDEX# pin twice. 2. Cannot detect a data address mark or a deleted data address mark on the specified track.

Status Registers 2

Bit	Name	R/W	Default	Description
7	Reserved	-	-	Unused. This bit is always “0”.
6	CM	R	-	Control Mark. Set when following conditions occurred: 1. Encounters a deleted data address mark during a READ DATA command. 2. Encounters a data address mark during a READ DELETED DATA command.
5	DD	R	-	Data Error in Data Field. The FDC detects a CRC error in the data field.
4	WC	R	-	Wrong Cylinder. Set when the track address from the sector ID field is different from the track address maintained inside the FDC.
3	SE	R	-	Scan Equal. Set if the equal condition is satisfied during execution of the SCAN command.
2	SN	R	-	Scan Not Satisfied. Set when the FDC cannot find a sector on the track which meets the desired condition during any scan command.
1	BC	R	-	Bad Cylinder. The track address from the sector ID field is different from the track address maintained inside the FDC and is equal to FFh which indicates a bad track.
0	MD	R	-	Missing Data Address Mark. Set when the FDC cannot detect a data address mark or a deleted data address mark.

Status Registers 3

Bit	Name	R/W	Default	Description
7	Reserved	-	-	Unused. This bit is always “0”.
6	WP	R	-	Write Protect. Indicates the status of WPT# pin.
5	Reserved	R	-	Unused. This bit is always “1”.
4	T0	R	-	Track 0. Indicates the status of the TRK0# pin.
3	Reserved.	R	-	Unused. This bit is always “1”.
2	HD	R	-	Head Address. Indicates the status of the HDSEL# pin.
1	DS1	R	-	Drive Select.

0	DS0	R	-	These two bits indicate the DS1, DS0 bits in the command phase.

7.2.3.10 Digital Input Register (PC-AT Mode) — Base + 7

Bit	Name	R/W	Default	Description
7	DSKCHG	R	-	This bit indicates the complement of DSKCHG# disk interface input.
6-0	Reserved	-	-	Reserved.

7.2.3.11 Digital Input Register (PS/2 Mode) — Base + 7

Bit	Name	R/W	Default	Description
7	DSKCHG	R	-	This bit indicates the complement of DSKCHG# disk interface input.
6-3	Reserved	-	-	Reserved.
2-1	DRATE	R	10	These bits indicate the status of the DRATE programmed through the Data Rate Select Register or Configuration Control Register.
0	HIGHDEN_N	R	1	0: 1Mbps or 500Kbps data rate is chosen. 1: 300Kbps or 250Kbps data rate is chosen.

7.2.3.12 Digital Input Register (Model 30 Mode) — Base + 7

Bit	Name	R/W	Default	Description
7	DSKCHG_N	R	-	This bit indicates the state of DSKCHG# disk interface input.
6-4	Reserved	-	-	Reserved.
3	DMAEN	R	0	This bit reflects the DMA bit in Digital Output Register.
2	NOPRE	R	0	This bit reflects the NOPRE bit in Configuration Control Register.
1-0	DRATE	R	10	These bits indicate the status of DRATE programmed through the Data Rate Select Register or Configuration Control Register.

7.2.3.13 Configuration Control Register (PC-AT and PS/2 Mode) — Base + 7

Bit	Name	R/W	Default	Description
7-2	Reserved	-	-	Reserved.
1-0	DRATE	W	10	These bit determine the data rate of the floppy controller. See DRATE bits in Data Rate Select Register.

7.2.3.14 Configuration Control Register (Model 30 Mode) — Base + 7

Bit	Name	R/W	Default	Description
7-3	Reserved	-	-	Reserved.

2	NOPRE	W	0	This bit could be programmed through Configuration Control Register and be read through the bit 2 in Digital Input Register in Model 30 Mode. But it has no functionality.
1-0	DRATE	W	10	These bit determine the data rate of the floppy controller. See DRATE bits in Data Rate Select Register.

7.2.3.15 FDC Commands

Terminology:

C	Cylinder Number 0 -256
D	Data Pattern
DIR	Step Direction
	0: step out
	1: step in
DS0	Drive Select 0
DS1	Drive Select 1
DTL	Data Length
EC	Enable Count
EOT	End of Track
EFIFO	Enable FIFO
	0: FIFO is enabled.
	1: FIFO is disabled.
EIS	Enable Implied Seek
FIFOTHR	FIFO Threshold
GAP	Alters Gap Length
GPL	Gap Length
H/HDS	Head Address
HLT	Head Load Time
HUT	Head Unload Time
LOCK	Lock EFIFO, FIFOTHR, PTRTRK bits.
	Prevent these bits from being affected by software reset.
MFM	MFM or FM mode
	0: FM
	1: MFM
MT	Multi-Track
N	Sector Size Code. All values up to 07h are allowable.
	00: 128 bytes
	01: 256 bytes
	.. ..
	07 16 Kbytes
NCN	New Cylinder Number
ND	Non-DMA Mode
OW	Overwritten
PCN	Present Cylinder Number
POLL	Polling disable
	0: polling is enabled.
	1: polling is disabled.
PRETRK	Precompensation Start Track Number
R	Sector address
RCN	Relative Cylinder Number
SC	Sector per Cylinder
SK	Skip deleted data address mark
SRT	Step Rate Time

ST0	Status Register 0
ST1	Status Register 1
ST2	Status Register 2
ST3	Status Register 3
WGATE	Write Gate alters timing of WE.

Read Data

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	MT	MFM	SK	0	0	1	1	0	Command code
	W	0	0	0	0	0	HDS	DS1	DS0	
	W	---------- C ----------								Sector ID information prior to command execution
	W	---------- H ----------								
	W	---------- R ----------								
	W	---------- N ----------								
	W	---------- EOT ----------								
	W	---------- GPL ----------								
	W	---------- DTL ----------								
Execution										Data transfer between the FDD and system
Result	R	---------- ST0 ----------								Status information after command execution.
	R	---------- ST1 ----------								
	R	---------- ST2 ----------								
	R	---------- C ----------								Sector ID information after command execution.
	R	---------- H ----------								
	R	---------- R ----------								
	R	---------- N ----------								

Read Deleted Data

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	MT	MFM	SK	0	1	1	0	0	Command code
	W	0	0	0	0	0	HDS	DS1	DS0	
	W	---------- C ----------								Sector ID information prior to command execution
	W	---------- H ----------								
	W	---------- R ----------								
	W	---------- N ----------								

	W	---------- EOT ----------	
	W	---------- GPL ----------	
	W	---------- DTL ----------	
Execution			Data transfer between the FDD and system
Result	R	---------- ST0 ----------	Status information after command execution.
	R	---------- ST1 ----------	
	R	---------- ST2 ----------	
	R	---------- C ----------	Sector ID information after command execution.
	R	---------- H ----------	
	R	---------- R ----------	
	R	---------- N ----------	

Read A Track

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	0	MFM	0	0	0	0	1	0	Command code
	W	0	0	0	0	0	HDS	DS1	DS0	
	W	---------- C ----------								Sector ID information prior to command execution
	W	---------- H ----------								
	W	---------- R ----------								
	W	---------- N ----------								
	W	---------- EOT ----------								
	W	---------- GPL ----------								
	W	---------- DTL ----------								
Execution										Data transfer between the FDD and system. FDD reads contents of all cylinders from index hole to EOT.
Result	R	---------- ST0 ----------								Status information after command execution.
	R	---------- ST1 ----------								
	R	---------- ST2 ----------								
	R	---------- C ----------								Sector ID information after command execution.
	R	---------- H ----------								
	R	---------- R ----------								
	R	---------- N ----------								

Read ID

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	0	MFM	0	0	1	0	1	0	Command code
	W	0	0	0	0	0	HDS	DS1	DS0	
Execution										The first correct ID information on the cylinder is stored in Data Register.
Result	R	---------- ST0 ----------								Status information after command execution.
	R	---------- ST1 ----------								
	R	---------- ST2 ----------								
	R	---------- C ----------								Disk status after the command has been completed.
	R	---------- H ----------								
	R	---------- R ----------								
	R	---------- N ----------								

Verify

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	MT	MFM	SK	1	0	1	1	0	Command code
	W	EC	0	0	0	0	HDS	DS1	DS0	
	W	---------- C ----------								Sector ID information prior to command execution
	W	---------- H ----------								
	W	---------- R ----------								
	W	---------- N ----------								
	W	---------- EOT ----------								
	W	---------- GPL ----------								
	W	---------- DTL/SC ----------								
Execution										No data transfer
Result	R	---------- ST0 ----------								Status information after command execution.
	R	---------- ST1 ----------								
	R	---------- ST2 ----------								
	R	---------- C ----------								Sector ID information after command execution.
	R	---------- H ----------								

	R	---------- R ----------	
	R	---------- N ----------	

Version

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	0	0	0	1	0	0	0	0	Command code
Result	R	1	0	0	1	0	0	0	0	Enhanced controller

Write Data

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	MT	MFM	0	0	0	1	0	1	Command code
	W	0	0	0	0	0	HDS	DS1	DS0	
	W	---------- C ----------								Sector ID information prior to command execution
	W	---------- H ----------								
	W	---------- R ----------								
	W	---------- N ----------								
	W	---------- EOT ----------								
	W	---------- GPL ----------								
	W	---------- DTL ----------								
Execution										Data transfer between the FDD and system.
Result	R	---------- ST0 ----------								Status information after command execution.
	R	---------- ST1 ----------								
	R	---------- ST2 ----------								
	R	---------- C ----------								Sector ID information after command execution.
	R	---------- H ----------								
	R	---------- R ----------								
	R	---------- N ----------								

Write Deleted Data

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	MT	MFM	0	0	1	0	0	1	Command code
	W	0	0	0	0	0	HDS	DS1	DS0	

	W	---------- C ----------	Sector ID information prior to command execution
	W	---------- H ----------	
	W	---------- R ----------	
	W	---------- N ----------	
	W	---------- EOT ----------	
	W	---------- GPL ----------	
	W	---------- DTL ----------	
Execution			Data transfer between the FDD and system.
Result	R	---------- ST0 ----------	Status information after command execution.
	R	---------- ST1 ----------	
	R	---------- ST2 ----------	
	R	---------- C ----------	Sector ID information after command execution.
	R	---------- H ----------	
	R	---------- R ----------	
	R	---------- N ----------	

Format A Track

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	0	MFM	0	0	1	1	0	1	Command code
	W	0	0	0	0	0	HDS	DS1	DS0	
	W	---------- N ----------								Bytes/Sector
	W	---------- SC ----------								Sectors/Cylinder
	W	---------- GPL ----------								Gap 3 Length
	W	---------- D ----------								Data Pattern
Execution for each sector (repeat)		---------- C ----------								Input sector parameter.
	W	---------- H ----------								
	W	---------- R ----------								
	W	---------- N ----------								
Result	R	---------- ST0 ----------								Status information after command execution.
	R	---------- ST1 ----------								
	R	---------- ST2 ----------								
	R	---------- Undefined ----------								
	R	---------- Undefined ----------								

	R	---------- Undefined ----------	
	R	---------- Undefined ----------	

Recalibrate

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	0	0	0	0	0	1	1	1	Command code
	W	0	0	0	0	0	0	DS1	DS0	
Execution										Head retracted to track 0

Sense Interrupt Status

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	0	0	0	0	1	0	0	0	Command code
Result	R	---------- ST0 ----------								
	R	---------- PCN ----------								

Specify

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	0	0	0	0	0	0	1	1	Command code
	W	|---------- SRT ----------|				|---------- HUT ----------|			
	W	|---------- SRT ----------|							ND	

Seek

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	0	0	0	0	1	1	1	1	Command code
	W	0	0	0	0	0	HDS	DS1	DS0	
	W	---------- NCN ----------								
Execution										Head positioned over proper cylinder on diskette

Configure

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark

Command	W	0	0	0	1	0	0	1	1	Command code
	W	0	0	0	0	0	HDS	DS1	DS0	
	W	0	EIS	EFIFO	POLL	|---------- FIFOTHR ----------|				
	W	---------- PRETRK ----------								
Execution										Internal registers written

Relative Seek

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	1	DIR	0	0	1	1	1	1	Command code
	W	0	0	0	0	0	HDS	DS1	DS0	
	W	---------- RCN ----------								

Perpendicular Mode

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	0	0	0	1	0	0	1	0	Command code
	W	OW	0	D3	D2	D1	D0	GAP	WGATE	

Lock

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	LOCK	0	0	1	0	1	0	0	Command code
Result	R	0	0	0	LOCK	0	0	0	0	

Dumpreg

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	0	0	0	0	1	1	1	0	Command code
Result	R	---------- PCN (Drive 0) ----------								
	R	---------- PCN (Drive 0) ----------								
	R	---------- PCN (Drive 0) ----------								
	R	---------- PCN (Drive 0) ----------								
	R	|---------- SRT ----------|				|---------- HUT ----------|			
	R	|---------- SRT ----------|							ND
	R	---------- SC/EOT ----------								

	R	LOCK	0	D3	D2	D1	D0	GAP	WGATE	
	R	0	EIS	EFIFO	POLL	|---------- FIFOTHR ----------|				
	R	---------- PRETRK ----------								

Sense Drive Status

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	0	0	0	0	0	1	0	0	Command code
	W	0	0	0	0	0	HDS	DS1	DS0	
Result	R	---------- ST3 ----------								Status information abut disk drive

Invalid

Phase	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Remark
Command	W	---------- Invalid Codes ----------								FDC goes to standby state.
Result	R	---------- ST0 ----------								ST0 = 80h

7.3 UART 1 Register

7.3.1 Logic Device Number Register

Logic Device Number Register — Index 07h

Bit	Name	R/W	Default	Description
7-0	LDN	R/W	00h	00h: Select FDC device configuration registers. 01h: Select UART 1 device configuration registers. 02h: Select UART 2 device configuration registers. 03h: Select Parallel Port device configuration registers. 04h: Select Hardware Monitor device configuration registers. 06h: Select GPIO device configuration registers. 0ah: Select PME device configuration registers. Otherwise: reserved.

7.3.2 UART 1 Configuration Register

UART IRQ Sharing Register — Index 26h

Bit	Name	R/W	Default	Description
7-2	Reserved	-	-	Reserved.
1	IRQ_MODE	R/W	0	0: PCI IRQ sharing mode (low level). 1: ISA IRQ sharing mode (low pulse).
0	IRQ_SHAR	R/W	0	0: disable IRQ sharing of two UART devices. 1: enable IRQ sharing of two UART devices.

UART 1 Device Enable Register — Index 30h

Bit	Name	R/W	Default	Description
7-1	Reserved	-	-	Reserved
0	UR1_EN	R/W	1	0: disable UART 1. 1: enable UART 1.

Base Address High Register — Index 60h

Bit	Name	R/W	Default	Description
7-0	BASE_ADDR_HI	R/W	03h	The MSB of UART 1 base address.

Base Address Low Register — Index 61h

Bit	Name	R/W	Default	Description
7-0	BASE_ADDR_LO	R/W	F8h	The LSB of UART 1 base address.

IRQ Channel Select Register — Index 70h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	Reserved.
3-0	SELUR1IRQ	R/W	4h	Select the IRQ channel for UART 1.

RS485 Enable Register — Index F0h

Bit	Name	R/W	Default	Description
7-5	Reserved	-	-	Reserved.

4	RS485_EN	R/W	0	0: RS232 driver. 1: RS485 driver. Auto drive RTS# low when transmitting data.
3-0	Reserved	-	-	Reserved.

7.3.3 Device Registers

7.3.3.1 Receiver Buffer Register — Base + 0

Bit	Name	R/W	Default	Description
7-0	RBR	R	00h	The data received. Read only when LCR[7] is 0

7.3.3.2 Transmitter Holding Register — Base + 0

Bit	Name	R/W	Default	Description
7-0	THR	W	00h	Data to be transmitted. Write only when LCR[7] is 0

7.3.3.3 Divisor Latch (LSB) — Base + 0

Bit	Name	R/W	Default	Description
7-0	DLL	R/W	01h	Baud generator divisor low byte. Access only when LCR[7] is 1.

7.3.3.4 Divisor Latch (MSB) — Base + 1

Bit	Name	R/W	Default	Description
7-0	DLM	R/W	00h	Baud generator divisor high byte. Access only when LCR[7] is 1.

7.3.3.5 Interrupt Enable Register — Base + 1

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	Reserved.
3	EDSSI	R/W	0	Enable Modem Status Interrupt. Access only when LCR[7] is 0.
2	ELSI	R/W	0	Enable Line Status Error Interrupt. Access only when LCR[7] is 0.
1	ETBFI	R/W	0	Enable Transmitter Holding Register Empty Interrupt. Access only when LCR[7] is 0.
0	ERBFI	R/W	0	Enable Received Data Available Interrupt. Access only when LCR[7] is 0.

7.3.3.6 Interrupt Identification Register — Base + 2

Bit	Name	R/W	Default	Description
7	FIFO_EN	R	0	0: FIFO is disabled 1: FIFO is enabled.

6	FIFO_EN	R	0	0: FIFO is disabled 1: FIFO is enabled.
5-4	Reserved	-	-	Reserved.
3-1	IRQ_ID	R	000	000: Interrupt is caused by Modem Status 001: Interrupt is caused by Transmitter Holding Register Empty 010: Interrupt is caused by Received Data Available. 110: Interrupt is caused by Character Timeout 011: Interrupt is caused by Line Status.
0	IRQ_PENDN	R	1	1: Interrupt is not pending. 0: Interrupt is pending.

7.3.3.7 FIFO Control Register — Base + 2

Bit	Name	R/W	Default	Description
7-6	RCV_TRIG	W	00	00: Receiver FIFO trigger level is 1. 01: Receiver FIFO trigger level is 4. 10: Receiver FIFO trigger level is 8. 11: Receiver FIFO trigger level is 14.
5-3	Reserved	-	-	Reserved.
2	CLRTX	R	0	Reset the transmitter FIFO.
1	CLRRX	R	0	Reset the receiver FIFO.
0	FIFO_EN	R	0	0: Disable FIFO. 1: Enable FIFO.

7.3.3.8 Line Control Register — Base + 3

Bit	Name	R/W	Default	Description
7	DLAB	R/W	0	0: Divisor Latch can't be accessed. 1: Divisor Latch can be accessed via Base and Base+1.
6	SETBRK	R/W	0	0: Transmitter is in normal condition. 1: Transmit a break condition.
5	STKPAR	R/W	0	XX0: Parity Bit is disable 001: Parity Bit is odd. 011: Parity Bit is even 101: Parity Bit is logic 1 111: Parity Bit is logic 0
4	EPS	R/W	0	
3	PEN	R/W	0	
2	STB	R/W	0	0: Stop bit is one bit 1: When word length is 5 bit stop bit is 1.5 bit else stop bit is 2 bit
1-0	WLS	R/W	00	00: Word length is 5 bit 01: Word length is 6 bit 10: Word length is 7 bit 11: Word length is 8 bit

7.3.3.9 MODEM Control Register — Base + 4

Bit	Name	R/W	Default	Description
7-5	Reserved	R/W	-	Reserved.
4	LOOP	R/W	0	0: UART in normal condition. 1: UART is internal loop back

3	OUT2	R/W	0	0: All interrupt is disabled. 1: Interrupt is enabled(disabled) by IER.
2	OUT1	R/W	0	Read from MSR[6] is loop back mode
1	RTS	R/W	0	0: RTS# is forced to logic 1 1: RTS# is forced to logic 0
0	DTR	R/W	0	0: DTR# is forced to logic 1 1: DTR# is forced to logic 0

7.3.3.10 Line Status Register — Base + 5

Bit	Name	R/W	Default	Description
7	RCR_ERR	R	0	0: No error in the FIFO when FIFO is enabled 1: Error in the FIFO when FIFO is enabled.
6	TEMT	R	1	0: Transmitter is in transmitting. 1: Transmitter is empty.
5	THRE	R	1	0: Transmitter Holding Register is not empty. 1: Transmitter Holding Register is empty.
4	BI	R	0	0: No break condition detected. 1: A break condition is detected.
3	FE	R	0	0: Data received has no frame error. 1: Data received has frame error.
2	PE	R	0	0: Data received has no parity error. 1: Data received has parity error.
1	OE	R	0	0: No overrun condition occurred. 1: An overrun condition occurred.
0	DR	R	0	0: No data is ready for read. 1: Data is received.

7.3.3.11 MODEM Status Register — Base + 6

Bit	Name	R/W	Default	Description
7	DCD	R	-	Complement of DCD# input. In loop back mode, this bit is equivalent to OUT2 in MCR.
6	RI	R	-	Complement of RI# input. In loop back mode , this bit is equivalent to OUT1 in MCR
5	DSR	R	-	Complement of DSR# input. In loop back mode , this bit is equivalent to DTR in MCR
4	CTS	R	-	Complement of CTS# input. In loop back mode , this bit is equivalent to RTS in MCR
3	DDCD	R	0	0: No state changed at DCD#. 1: State changed at DCD#.
2	TERI	R	0	0: No Trailing edge at RI#. 1: A low to high transition at RI#.
1	DDSR	R	0	0: No state changed at DSR#. 1: State changed at DSR#.
0	DCTS	R	0	0: No state changed at CTS#. 1: State changed at CTS#.

7.3.3.12 Scratch Register — Base + 7

Bit	Name	R/W	Default	Description
7-0	SCR	R/W	00h	Scratch register.

7.4 UART 2 Register

7.4.1 Logic Device Number Register

Logic Device Number Register — Index 07h

Bit	Name	R/W	Default	Description
7-0	LDN	R/W	00h	00h: Select FDC device configuration registers. 01h: Select UART 1 device configuration registers. 02h: Select UART 2 device configuration registers. 03h: Select Parallel Port device configuration registers. 04h: Select Hardware Monitor device configuration registers. 06h: Select GPIO device configuration registers. 0ah: Select PME device configuration registers. Otherwise: reserved.

7.4.2 UART 2 Configuration Registers

UART IRQ Sharing Register — Index 26h

Bit	Name	R/W	Default	Description
7-2	Reserved	-	-	Reserved.
1	IRQ_MODE	R/W	0	0: PCI IRQ sharing mode (low level). 1: ISA IRQ sharing mode (low pulse).
0	IRQ_SHAR	R/W	0	0: disable IRQ sharing of two UART devices. 1: enable IRQ sharing of two UART devices.

UART 2 Device Enable Register — Index 30h

Bit	Name	R/W	Default	Description
7-1	Reserved	-	-	Reserved
0	UR2_EN	R/W	1	0: disable UART 2. 1: enable UART 2.

Base Address High Register — Index 60h

Bit	Name	R/W	Default	Description
7-0	BASE_ADDR_HI	R/W	02h	The MSB of UART 2 base address.

Base Address Low Register — Index 61h

Bit	Name	R/W	Default	Description
7-0	BASE_ADDR_LO	R/W	F8h	The LSB of UART 2 base address.

IRQ Channel Select Register — Index 70h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	Reserved.
3-0	SELUR2IRQ	R/W	3h	Select the IRQ channel for UART 2.

RS485 Enable Register — Index F0h

Bit	Name	R/W	Default	Description
7-5	Reserved	-	-	Reserved.
4	RS485_EN	R/W	0	0: RS232 driver. 1: RS485 driver. Auto drive RTS# low when transmitting data.
3	RXW4C_IR	R/W	0	0: No reception delay when SIR is changed form TX to RX. 1: Reception delays 4 characters time when SIR is changed form TX to RX.
2	TXW4C_IR	R/W	0	0: No transmission delay when SIR is changed form RX to TX. 1: Transmission delays 4 characters time when SIR is changed form RX to TX.
1-0	Reserved	-	-	Reserved.

SIR Mode Control Register — Index F1h

Bit	Name	R/W	Default	Description
7	Reserved	-	-	Reserved.
6	Reserved	-	-	Reserved.
5	Reserved	-	-	Reserved.

4-3	IRMODE	R/W	00	00: disable IR function. 01: disable IR function. 10: IrDA function, active pulse is 1.6uS. 11: IrDA function, active pulse is 3/16 bit time.
2	HDUPLX	R/W	1	0: SIR is in full duplex mode for loopbak test. TXW4C_IR and RXW4C_IR are of no use. 1: SIR is in half duplex mode.
1	TXINV_IR	R/W	0	0: IRTX is in normal condition. 1: inverse the IRTX.
0	RXINV_IR	R/W	0	0: IRRX is in normal condition. 1: inverse the IRRX.

7.4.3 Device Registers

7.4.3.1 Receiver Buffer Register — Base + 0

Bit	Name	R/W	Default	Description
7-0	RBR	R	00h	The data received. Read only when LCR[7] is 0

7.4.3.2 Transmitter Holding Register — Base + 0

Bit	Name	R/W	Default	Description
7-0	THR	W	00h	Data to be transmitted. Write only when LCR[7] is 0

7.4.3.3 Divisor Latch (LSB) — Base + 0

Bit	Name	R/W	Default	Description
7-0	DLL	R/W	01h	Baud generator divisor low byte. Access only when LCR[7] is 1.

7.4.3.4 Divisor Latch (MSB) — Base + 1

Bit	Name	R/W	Default	Description
7-0	DLM	R/W	00h	Baud generator divisor high byte. Access only when LCR[7] is 1.

7.4.3.5 Interrupt Enable Register — Base + 1

Bit	Name	R/W	Default	Description

7-4	Reserved	-	-	Reserved.
3	EDSSI	R/W	0	Enable Modem Status Interrupt. Access only when LCR[7] is 0.
2	ELSI	R/W	0	Enable Line Status Error Interrupt. Access only when LCR[7] is 0.
1	ETBFI	R/W	0	Enable Transmitter Holding Register Empty Interrupt. Access only when LCR[7] is 0.
0	ERBFI	R/W	0	Enable Received Data Available Interrupt. Access only when LCR[7] is 0.

7.4.3.6 Interrupt Identification Register — Base + 2

Bit	Name	R/W	Default	Description
7	FIFO_EN	R	0	0: FIFO is disabled 1: FIFO is enabled.
6	FIFO_EN	R	0	0: FIFO is disabled 1: FIFO is enabled.
5-4	Reserved	-	-	Reserved.
3-1	IRQ_ID	R	000	000: Interrupt is caused by Modem Status 001: Interrupt is caused by Transmitter Holding Register Empty 010: Interrupt is caused by Received Data Available. 110: Interrupt is caused by Character Timeout 011: Interrupt is caused by Line Status.
0	IRQ_PENDN	R	1	1: Interrupt is not pending. 0: Interrupt is pending.

7.4.3.7 FIFO Control Register — Base + 2

Bit	Name	R/W	Default	Description
7-6	RCV_TRIG	W	00	00: Receiver FIFO trigger level is 1. 01: Receiver FIFO trigger level is 4. 10: Receiver FIFO trigger level is 8. 11: Receiver FIFO trigger level is 14.
5-3	Reserved	-	-	Reserved.
2	CLRTX	R	0	Reset the transmitter FIFO.
1	CLRRX	R	0	Reset the receiver FIFO.
0	FIFO_EN	R	0	0: Disable FIFO. 1: Enable FIFO.

7.4.3.8 Line Control Register — Base + 3

Bit	Name	R/W	Default	Description
7	DLAB	R/W	0	0: Divisor Latch can't be accessed. 1: Divisor Latch can be accessed via Base and Base+1.
6	SETBRK	R/W	0	0: Transmitter is in normal condition. 1: Transmit a break condition.
5	STKPAR	R/W	0	XX0: Parity Bit is disable 001: Parity Bit is odd. 011: Parity Bit is even 101: Parity Bit is logic 1 111: Parity Bit is logic 0
4	EPS	R/W	0	
3	PEN	R/W	0	

2	STB	R/W	0	0: Stop bit is one bit 1: When word length is 5 bit stop bit is 1.5 bit else stop bit is 2 bit
1-0	WLS	R/W	00	00: Word length is 5 bit 01: Word length is 6 bit 10: Word length is 7 bit 11: Word length is 8 bit

7.4.3.9 MODEM Control Register — Base + 4

Bit	Name	R/W	Default	Description
7-5	Reserved	R/W	-	Reserved.
4	LOOP	R/W	0	0: UART in normal condition. 1: UART is internal loop back
3	OUT2	R/W	0	0: All interrupt is disabled. 1: Interrupt is enabled(disabled) by IER.
2	OUT1	R/W	0	Read from MSR[6] is loop back mode
1	RTS	R/W	0	0: RTS# is forced to logic 1 1: RTS# is forced to logic 0
0	DTR	R/W	0	0: DTR# is forced to logic 1 1: DTR# is forced to logic 0

7.4.3.10 Line Status Register — Base + 5

Bit	Name	R/W	Default	Description
7	RCR_ERR	R	0	0: No error in the FIFO when FIFO is enabled 1: Error in the FIFO when FIFO is enabled.
6	TEMT	R	1	0: Transmitter is in transmitting. 1: Transmitter is empty.
5	THRE	R	1	0: Transmitter Holding Register is not empty. 1: Transmitter Holding Register is empty.
4	BI	R	0	0: No break condition detected. 1: A break condition is detected.
3	FE	R	0	0: Data received has no frame error. 1: Data received has frame error.
2	PE	R	0	0: Data received has no parity error. 1: Data received has parity error.
1	OE	R	0	0: No overrun condition occurred. 1: An overrun condition occurred.
0	DR	R	0	0: No data is ready for read. 1: Data is received.

7.4.3.11 MODEM Status Register — Base + 6

Bit	Name	R/W	Default	Description
7	DCD	R	-	Complement of DCD# input. In loop back mode, this bit is equivalent to OUT2 in MCR.
6	RI	R	-	Complement of RI# input. In loop back mode , this bit is equivalent to OUT1 in MCR
5	DSR	R	-	Complement of DSR# input. In loop back mode , this bit is equivalent to DTR in MCR

4	CTS	R	-	Complement of CTS# input. In loop back mode , this bit is equivalent to RTS in MCR
3	DDCD	R	0	0: No state changed at DCD#. 1: State changed at DCD#.
2	TERI	R	0	0: No Trailing edge at RI#. 1: A low to high transition at RI#.
1	DDSR	R	0	0: No state changed at DSR#. 1: State changed at DSR#.
0	DCTS	R	0	0: No state changed at CTS#. 1: State changed at CTS#.

7.4.3.12 Scratch Register — Base + 7

Bit	Name	R/W	Default	Description
7-0	SCR	R/W	00h	Scratch register.

7.5 Parallel Port Register

7.5.1 Logic Device Number Register

Logic Device Number Register — Index 07h

Bit	Name	R/W	Default	Description
7-0	LDN	R/W	00h	00h: Select FDC device configuration registers. 01h: Select UART 1 device configuration registers. 02h: Select UART 2 device configuration registers. 03h: Select Parallel Port device configuration registers. 04h: Select Hardware Monitor device configuration registers. 06h: Select GPIO device configuration registers. 0ah: Select PME device configuration registers. Otherwise: reserved.

7.5.2 Parallel Port Configuration Registers

Parallel Port Device Enable Register — Index 30h

Bit	Name	R/W	Default	Description
7-1	Reserved	-	-	Reserved
0	PRT_EN	R/W	1	0: disable Parallel Port. 1: enable Parallel Port.

Base Address High Register — Index 60h

Bit	Name	R/W	Default	Description
7-0	BASE_ADDR_HI	R/W	03h	The MSB of Parallel Port base address.

Base Address Low Register — Index 61h

Bit	Name	R/W	Default	Description
7-0	BASE_ADDR_LO	R/W	78h	The LSB of Parallel Port base address.

IRQ Channel Select Register — Index 70h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	Reserved.
3-0	SELPRTIRQ	R/W	7h	Select the IRQ channel for Parallel Port.

DMA Channel Select Register — Index 74h

Bit	Name	R/W	Default	Description
7-5	Reserved	-	0	Reserved.
4	ECP_DMA_MODE	R/W	0	0: non-burst mode DMA. 1: enable burst mode DMA.
3	Reserved	-	0	Reserved.
2-0	SELPRTDMA	R/W	011	Select the DMA channel for Parallel Port.

PRT Mode Select Register — Index F0h

Bit	Name	R/W	Default	Description
7	Reserved	-	-	Reserved.
6-3	ECP_FIFO_THR	R/W	1000	ECP FIFO threshold.
2-0	PRT_MODE	R/W	010	000: Standard and Bi-direction (SPP) mode. 001: EPP 1.9 and SPP mode. 010: ECP mode (default). 011: ECP and EPP 1.9 mode. 100: Printer mode. 101: EPP 1.7 and SPP mode. 110: Reserved. 111: ECP and EPP1.7 mode.

7.5.3 Device Registers

7.5.3.1 Parallel Port Data Register — Base + 0

Bit	Name	R/W	Default	Description
7-0	DATA	R/W	00h	The output data to drive the parallel port data lines.

7.5.3.2 ECP Address FIFO Register — Base + 0

Bit	Name	R/W	Default	Description
7-0	ECP_AFIFO	R/W	00h	Access only in ECP Parallel Port Mode and the ECP_MODE programmed in the Extended Control Register is 011. The data written to this register is placed in the FIFO and tagged as an Address/RLE. It is auto transmitted by the hardware. The operation is only defined for forward direction. It divide into two parts : Bit 7 : 0: bits 6-0 are run length, indicating how many times the next byte to appear (0 = 1time, 1 = 2times, 2 = 3times and so on). 1: bits 6-0 are a ECP address. Bit 6-0 : Address or RLE depends on bit 7.

7.5.3.3 Device Status Register — Base + 1

Bit	Name	R/W	Default	Description
7	BUSY_N	R	-	Inverted version of parallel port signal BUSY.
6	ACK_N	R	-	Version of parallel port signal ACK#.
5	PERROR	R	-	Version of parallel port signal PE.
4	SELECT	R	-	Version of parallel port signal SLCT.
3	ERR_N	R	-	Version of parallel port signal ERR#.
2-1	Reserved	R	11	Reserved. Return 11b when read.
0	TMOUT	R	-	This bit is valid only in EPP mode. Return 1 when in other modes. It indicates that a 10uS time out has occurred on the EPP bus. 0: no time out error. 1: time out error occurred, write 1 to clear.

7.5.3.4 Device Control Register — Base + 2

Bit	Name	R/W	Default	Description
7-6	Reserved	-	11	Reserved. Return 11b when read.
5	DIR	R/W	0	0: the parallel port is in output mode. 1: the parallel port is in input mode. It is auto reset to 0 when in SPP mode.
4	ACKIRQ_EN	R/W	0	Enable an interrupt at the rising edge of ACK#.
3	SLIN	R/W	0	Inverted and then drives the parallel port signal SLIN#. When read, the status of inverted SLIN# is return.
2	INIT_N	R/W	0	Drives the parallel port signal INIT#. When read, the status of INIT# is return.
1	AFD	R/W	0	Inverted and then drives the parallel port signal AFD#. When read, the status of inverted AFD# is return.

0	STB	R/W	0	Inverted and then drives the parallel port signal STB#. When read, the status of inverted STB# is return.

7.5.3.5 EPP Address Register — Base + 3

Bit	Name	R/W	Default	Description
7	EPP_ADDR	R/W	00h	Write this register will cause the hardware to auto transmit the written data to the device with the EPP Address Write protocol. Read this register will cause the hardware to auto receive data from the device by with the EPP Address Read protocol.

7.5.3.6 EPP Data Register — Base + 4 – Base + 7

Bit	Name	R/W	Default	Description
7	EPP_DATA	R/W	00h	Write this register will cause the hardware to auto transmit the written data to the device with the EPP Data Write protocol. Read this register will cause the hardware to auto receive data from the device by with the EPP Data Read protocol.

7.5.3.7 Parallel Port Data FIFO — Base + 400h

Bit	Name	R/W	Default	Description
7-0	C_FIFO	R/W	00h	Data written to this FIFO is auto transmitted by the hardware to the device by using standard parallel port protocol. It is only valid in ECP and the ECP_MODE is 010b.The operation is only for forward direction.

7.5.3.8 ECP Data FIFO — Base + 400h

Bit	Name	R/W	Default	Description
7-0	ECP_DFIFO	R/W	00h	Data written to this FIFO when DIR is 0 is auto transmitted by the hardware to the device by using ECP parallel port protocol. Data is auto read from device into the FIFO when DIR is 1 by the hardware by using ECP parallel port protocol. Read the FIFO will return the content to the system. It is only valid in ECP and the ECP_MODE is 011b.

7.5.3.9 ECP Test FIFO — Base + 400h

Bit	Name	R/W	Default	Description
7-0	T_FIFO	R/W	00h	Data may be read, written from system to the FIFO in any Direction. But no hardware handshake occurred on the parallel port lines. It could be used to test the empty, full and threshold of the FIFO. It is only valid in ECP and the ECP_MODE is 110b.

7.5.3.10 ECP Configuration Register A — Base + 400h

Bit	Name	R/W	Default	Description

7	IRQ_MODE	R	0	0: interrupt is ISA pulse. 1: interrupt is ISA level. Only valid in ECP and ECP_MODE is 111b.
6-4	IMPID	R	001	000: the design is 16-bit implementation. 001: the design is 8-bit implementation (default). 010: the design is 32-bit implementation. 011-111: Reserved. Only valid in ECP and ECP_MODE is 111b.
3	Reserved	R	-	Reserved.
2	BYTETRAN_N	R	1	0: when transmitting there is 1 byte waiting in the transceiver that does not affect the FIFO full condition. 1: when transmitting the state of the full bit includes the byte being transmitted. Only valid in ECP and ECP_MODE is 111b.
1-0	Reserved	R	00	Return 00 when read. Only valid in ECP and ECP_MODE is 111b.

7.5.3.11 ECP Configuration Register B — Base + 401h

Bit	Name	R/W	Default	Description
7	COMP	R	0	0: only send uncompressed data. 1: compress data before sending. Only valid in ECP and ECP_MODE is 111b.
6	Reserved	R	1	Reserved. Return 1 when read. Only valid in ECP and ECP_MODE is 111b.
5-3	ECP_IRQ_CH	R	001	000: the interrupt selected with jumper. 001: select IRQ 7 (default). 010: select IRQ 9. 011: select IRQ 10. 100: select IRQ 11. 101: select IRQ 14. 110: select IRQ 15. 111: select IRQ 5. Only valid in ECP and ECP_MODE is 111b.
2-0	ECP_DMA_CH	R	011	Return the DMA channel of ECP parallel port. Only valid in ECP and ECP_MODE is 111b.

7.5.3.12 Extended Control Register — Base + 402h

Bit	Name	R/W	Default	Description
7-5	ECP_MODE	R/W	000	000: SPP Mode. 001: PS/2 Parallel Port Mode. 010: Parallel Port Data FIFO Mode. 011: ECP Parallel Port Mode. 100: EPP Mode. 101: Reserved. 110: Test Mode. 111: Configuration Mode. Only valid in ECP.

4	ERRINTR_EN	R/W	0	0: disable the interrupt generated on the falling edge of ERR#. 1: enable the interrupt generated on the falling edge of ERR#.
3	DAMEN	R/W	0	0: disable DMA. 1: enable DMA. DMA starts when SERVICEINTR is 0.
2	SERVICEINTR	R/W	1	0: enable the following case of interrupt. DMAEN = 1: DMA mode. DMAEN = 0, DIR = 0: set to 1 whenever there are writeIntrThreshold or more bytes are free in the FIFO. DMAEN = 0, DIR = 0: set to 1 whenever there are readIntrThreshold or more bytes are valid to be read in the FIFO.
1	FIFOFULL	R	0	0: The FIFO has at least 1 free byte. 1: The FIFO is completely full.
0	FIFOEMPTY	R	0	0: The FIFO contains at least 1 byte. 1: The FIFO is completely empty.

7.6 Hardware Monitor Register

7.6.1 Logic Device Number Registers

Logic Device Number Register — Index 07h

Bit	Name	R/W	Default	Description
7-0	LDN	R/W	00h	00h: Select FDC device configuration registers. 01h: Select UART 1 device configuration registers. 02h: Select UART 2 device configuration registers. 03h: Select Parallel Port device configuration registers. 04h: Select Hardware Monitor device configuration registers. 06h: Select GPIO device configuration registers. 0ah: Select PME device configuration registers. Otherwise: reserved.

7.6.2 Hardware Monitor Configuration Registers

Hardware Monitor Device Enable Register — Index 30h

Bit	Name	R/W	Default	Description
7-1	Reserved	-	-	Reserved
0	HM_EN	R/W	0	0: disable Hardware Monitor. 1: enable Hardware Monitor.

Base Address High Register — Index 60h

Bit	Name	R/W	Default	Description
7-0	BASE_ADDR_HI	R/W	02h	The MSB of Hardware Monitor base address.

Base Address Low Register — Index 61h

Bit	Name	R/W	Default	Description
7-0	BASE_ADDR_LO	R/W	95h	The LSB of Hardware Monitor base address.

IRQ Channel Select Register — Index 70h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	Reserved.
3-0	SELHMIRQ	R/W	0h	Select the IRQ channel for Hardware Monitor.

7.6.3 Device Registers

7.6.3.1 START_STOP Control Register — Index 00h

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

7.6.3.2 Temperature Mode Control Register — Index 01h

Bit	Name	R/W	Default	Description
7-6	Temperature Fault Queue	R/W	00	This value stands for how many times of successive temperature fault can be tolerated. 00: 1 times. 01: 2 times. 10: 4 times. 11: 8 times.
5-4	Reserved	R	-	Read back data will be “0”.
3	COMB_LEVEL	R/W	1	Set to 1, enable COMB filter. Set to 0, disable COMB filter. COMB filter is only applied to BJT thermal diode mode. If temperature select thermistor mode, the COMB filter will not work on it.

2	T3_MODE	R/W	0	Set to 1, select T3 as connected to a BJT thermal diode. At this mode, T3 detected temperature ranges from 0°C ~ 140°C, not considering the T3OFFSET(index 92h) effect. Set to 0, select T3 as connected to a thermistor. At this mode, T3 detected temperature ranges from 0°C ~ 127°C, not considering the T3OFFSET(index 92h) effect.
1	T2_MODE	R/W	0	Set to 1, select T2 as connected to a BJT thermal diode. At this mode, T2 detected temperature ranges from 0°C ~ 140°C, not considering the T2OFFSET(index 91h) effect. Set to 0, select T2 as connected to a thermistor. At this mode, T2 detected temperature ranges from 0°C ~ 127°C, not considering the T2OFFSET(index 91h) effect.
0	T1_MODE	R/W	0	Set to 1, select T1 as connected to a BJT thermal diode. At this mode, T1 detected temperature ranges from 0°C ~ 140°C, not considering the T1OFFSET(index 90h) effect. Set to 0, select T1 as connected to a thermistor. At this mode, T1 detected temperature ranges from 0°C ~ 127°C, not considering the T1OFFSET(index 90h) effect.

7.6.3.3 ADC_CLK Frequency Control Register — Index 02h

Bit	Name	R/W	Default	Description
7-2	Reserved	R/W	-	
1-0	ADC_CLK_SEL	R/W	00	Select ADC clock frequency. 00 : 12.8K(Default) 01 : 6.4K 10 : 3.2K 11 : 1.6K

7.6.3.4 External BJT Offset Register — Index 09h

Bit	Name	R/W	Default	Description
7-0	Reserved	R/W	37h	

7.6.3.5 FAN1 Full Speed Count Register 0 — Index 0Ah

Bit	Name	R/W	Default	Description
7-0	F1_FULL(MSB)	R	0Fh	When power on, the FANPWM1 will output full duty cycle (FFh) to enable system FAN. After 10 seconds **when detecting FANIN 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 FANIN after power on, the PWMOUT1 will keep outputting FFh duty cycle.

7.6.3.6 FAN1 Full speed Count Register 1— Index 0Bh

Bit	Name	R/W	Default	Description

7-0	F1_FULL(LSB)	R	FFh	When power on, the FANPWM1 will output full duty cycle (FFh) to enable system FAN. After 10 seconds **when detecting FANIN 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 FANIN after power on, the PWMOUT1 will keep outputting FFh duty cycle.

7.6.3.7 FAN2 Full Speed Count Register 0 — Index 0Ch

Bit	Name	R/W	Default	Description
7-0	F2_FULL(MSB)	R	0Fh	When power on, the FANPWM2 will output full duty cycle (FFh) to enable system FAN. After 10 seconds **when detecting FANIN 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.

7.6.3.8 FAN2 Full speed Count Register 1— Index 0Dh

Bit	Name	R/W	Default	Description
7-0	F2_FULL(LSB)	R	FFh	When power on, the FANPWM2 will output full duty cycle (FFh) to enable system FAN. After 10 seconds **when detecting FANIN 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 PWMOUT2 will keep outputting FFh duty cycle.

7.6.3.9 FAN3 Full Speed Count Register 0 — Index 0Eh

Bit	Name	R/W	Default	Description
7-0	F3_FULL(MSB)	R	0Fh	When power on, the FANPWM3 will output full duty cycle (FFh) to enable system FAN. After 10 seconds **when detecting FANIN 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 PWMOUT3 will keep outputting FFh duty cycle.

7.6.3.10 FAN3 Full speed Count Register 1— Index 0Fh

Bit	Name	R/W	Default	Description
7-0	F3_FULL(LSB)	R	FFh	When power on, the FANPWM3 will output full duty cycle (FFh) to enable system FAN. After 10 seconds **when detecting FANIN 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 FANIN3 after power on, the PWMOUT3 will keep outputting FFh duty cycle.

7.6.3.11 Value RAM — Index 10h - 2Fh, 40h - 59h

In the following table, the unit of voltage reading/limit is 8mV. The unit of temperature reading/limit is 1°C.

Address 10-3F	R/W	Description
0Ah	RO	FAN1 full speed count reading [11:8]

0Bh	RO	FAN1 full speed count reading [7:0]
0Ch	RO	FAN2 full speed count reading [11:8]
0Dh	RO	FAN2 full speed count reading [7:0]
0Eh	RO	FAN3 full speed count reading [11:8]
0Fh	RO	FAN3 full speed count reading [7:0]
10h	RO	VCC reading. This reading is the divided voltage of VCC inside the chip.
11h	RO	VIN1 reading.
12h	RO	VIN2 reading.
13h	RO	VIN3 reading.
14h	RO	VIN4 reading.
15h	RO	VIN5 reading.
16h	RO	VIN6 reading.
17h	RO	VIN7 reading.
18h	RO	VIN8 reading.
19h		Reserved
1Ah		Reserved
1Bh	RO	T1 temperature reading.
1Ch	RO	T2 temperature reading.
1Dh	RO	T3 temperature reading.
1Eh		Reserved
20h	RO	FAN1 count reading (MSB)
21h	RO	FAN1 count reading (LSB)
22h	RO	FAN2 count reading (MSB)
23h	RO	FAN2 count reading (LSB)
24h	RO	FAN3 count reading (MSB)
25h	RO	FAN3 count reading (LSB)
26h ~ 27h		Reserved
28h	R/W	FAN1 count limit. (MSB)
29h	R/W	FAN1 count limit. (LSB)
2Ah	R/W	FAN2 count limit. (MSB)
2Bh	R/W	FAN2 count limit. (LSB).
2Ch	R/W	FAN3 count limit. (MSB)
2Dh	R/W	FAN3 count limit. (LSB)
2Eh		Reserved
2Fh		Reserved
40h	R/W	VCC high limit. This limit should correspond to the divided voltage.
41h	R/W	VCC low limit. This limit should correspond to the divided voltage.
42h	R/W	VIN1 high limit.
43h	R/W	VIN1 low limit.
44h	R/W	VIN2 high limit.
45h	R/W	VIN2 low limit.
46h	R/W	VIN3 high limit.
47h	R/W	VIN3 low limit.
48h	R/W	VIN4 high limit.
49h	R/W	VIN4 low limit.
4Ah	R/W	VIN5 high limit.
4Bh	R/W	VIN5 low limit.
4Ch	R/W	VIN6 high limit.
4Dh	R/W	VIN6 low limit.
4Eh	R/W	VIN7 high limit.
4Fh	R/W	VIN7 low limit.
50h	R/W	VIN8 high limit.

51h	R/W	VIN8 low limit.
52h		Reserved
53h		Reserved
54h	R/W	T1 high limit.
55h	R/W	T1 low limit.
56h	R/W	T2 high limit.
57h	R/W	T2 low limit.
58h	R/W	T3 high limit.
59h	R/W	T3 low limit.

7.6.3.12 INTERRUPT ENABLE Control Register 1 — Index 30h

Bit	Name	R/W	Default	Description
7	EN_VIN7	R/W	0	Set to 1, enables VIN7 abnormal interrupt.
6	EN_VIN6	R/W	0	Set to 1, enables VIN6 abnormal interrupt.
5	EN_VIN5	R/W	0	Set to 1, enables VIN5 abnormal interrupt.
4	EN_VIN4	R/W	0	Set to 1, enables VIN4 abnormal interrupt.
3	EN_VIN3	R/W	0	Set to 1, enables VIN3 abnormal interrupt.
2	EN_VIN2	R/W	0	Set to 1, enables VIN2 abnormal interrupt.
1	EN_VIN1	R/W	0	Set to 1, enables VIN1 abnormal interrupt.
0	EN_3VDD	R/W	0	Set to 1, enables 3VDD abnormal interrupt.

7.6.3.13 INTERRUPT ENABLE Control Register 2 — Index 31h

Bit	Name	R/W	Default	Description
7-6	Reserved	-	-	Reserved.
5	EN_T3	R/W	0	Set to 1, enables T3 abnormal interrupt.
4	EN_T2	R/W	0	Set to 1, enables T2 abnormal interrupt.
3	EN_T1	R/W	0	Set to 1, enables T1 abnormal interrupt.
2	Reserved	-	-	Reserved.
1	Reserved	-	-	Reserved.
0	EN_VIN8	R/W	0	Set to 1, enables VIN8 abnormal interrupt.

7.6.3.14 INTERRUPT ENABLE Control Register 3 — Index 32h

Bit	Name	R/W	Default	Description
7	Reserved	-	-	Reserved.
6	Reserved	-	-	Reserved.
5	EN_FAN3_TAR	R/W	0	Set to 1, enables FAN3 target speed mismatched interrupt when FANPWM3 duty-cycle is 100%.
4	EN_FAN2_TAR	R/W	0	Set to 1, enables FAN2 target speed mismatched interrupt when FANPWM2 duty-cycle is 100%.
3	EN_FAN1_TAR	R/W	0	Set to 1, enables FAN1 target speed mismatched interrupt when FANPWM1 duty-cycle is 100%.
2	EN_FAN3_LMT	R/W	0	Set to 1, enables FAN3 abnormal interrupt.

1	EN_FAN2_LMT	R/W	0	Set to 1, enables FAN2 abnormal interrupt.
0	EN_FAN1_LMT	R/W	0	Set to 1, enables FAN1 abnormal interrupt.

7.6.3.15 INTERRUPT STATUS Register 1 — Index 33h

Bit	Name	R/W	Default	Description
7	VIN7_STS	R/W	0	A one indicates VIN7 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
6	VIN6_STS	R/W	0	A one indicates VIN6 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
5	VIN5_STS	R/W	0	A one indicates VIN5 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
4	VIN4_STS	R/W	0	A one indicates VIN4 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
3	VIN3_STS	R/W	0	A one indicates VIN3 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
2	VIN2_STS	R/W	0	A one indicates VIN2 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
1	VIN1_STS	R/W	0	A one indicates VIN1 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
0	3VDD_STS	R/W	0	A one indicates 3VDD reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.

7.6.3.16 INTERRUPT STATUS Register 2 — Index 34h

Bit	Name	R/W	Default	Description
7-6	Reserved	-	-	Reserved.
5	T3_STS	R/W	0	A one indicates T3 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
4	T2_STS	R/W	0	A one indicates T2 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
3	T1_STS	R/W	0	A one indicates T1 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
2	Reserved	-	-	Reserved.
1	Reserved	-	-	Reserved.
0	VIN8_STS	R/W	0	A one indicates VIN8 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.

7.6.3.17 INTERRUPT STATUS Register 3 — Index 35h

Bit	Name	R/W	Default	Description
7	Reserved	-	-	Reserved.
6	Reserved	-	-	Reserved.
5	FAN3_TAR_STS	R/W	0	A one indicates FAN3 can not reach the expect count in time. The time is defined by FAN3 Fault Time registers.

4	FAN2_TAR_STS	R/W	0	A one indicates FAN2 can not reach the expect count in time. The time is defined by FAN2 Fault Time registers.
3	FAN1_TAR_STS	R/W	0	A one indicates FAN1 can not reach the expect count in time. The time is defined by FAN1 Fault Time registers.
2	FAN3_STS	R/W	0	A one indicates FAN3 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
1	FAN2_STS	R/W	0	A one indicates FAN2 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.
0	FAN1_STS	R/W	0	A one indicates FAN1 reaches its high or low limit. Write 1 to clear this bit, write 0 will be ignored.

7.6.3.18 REAL_TIME STATUS Register 1 — Index 36h

Bit	Name	R/W	Default	Description
7	VIN7_RT	R	0	A one indicates VIN7 is at abnormal range.
6	VIN6_RT	R	0	A one indicates VIN6 is at abnormal range.
5	VIN5_RT	R	0	A one indicates VIN5 is at abnormal range.
4	VIN4_RT	R	0	A one indicates VIN4 is at abnormal range.
3	VIN3_RT	R	0	A one indicates VIN3 is at abnormal range.
2	VIN2_RT	R	0	A one indicates VIN2 is at abnormal range.
1	VIN1_RT	R	0	A one indicates VIN1 is at abnormal range.
0	3VDD_RT	R	0	A one indicates 3VDD is at abnormal range.

7.6.3.19 REAL_TIME STATUS Register 2 — Index 37h

Bit	Name	R/W	Default	Description
7-6	Reserved	-	-	Reserved.
5	T3_RT	R	0	A one indicates T3 exceeds its high limit.
4	T2_RT	R	0	A one indicates T2 exceeds its high limit.
3	T1_RT	R	0	A one indicates T1 exceeds its high limit.
2	Reserved	-	-	Reserved.
1	Reserved	-	-	Reserved.
0	VIN8_RT	R	0	A one indicates VIN8 exceeds its high limit.

7.6.3.20 REAL_TIME STATUS Register 3 — Index 38h

Bit	Name	R/W	Default	Description
7	Reserved	-	-	Reserved.
6	Reserved	-	-	Reserved.
5	FAN3_TAR_RT	R	0	A one indicates FAN3 can not reach the expect count in time when FANPWM3 duty-cycle is 100%. The time is defined by FAN3 Fault Time registers. After FAN3 reaches the expect count, the bit will be set to 0.
4	FAN2_TAR_RT	R	0	A one indicates FAN2 can not reach the expect count in time when FANPWM2 duty-cycle is 100%. The time is defined by FAN2 Fault Time registers. After FAN2 reaches the expect count, the bit will be set to 0.

3	FAN1_TAR_RT	R	0	A one indicates FAN1 can not reach the expect count in time when FANPWM1 duty-cycle is 100%. The time is defined by FAN1 Fault Time registers. After FAN1 reaches the expect count, the bit will be set to 0.
2	FAN3_RT	R	0	A one indicates FAN3 is at abnormal range.
1	FAN2_RT	R	0	A one indicates FAN2 is at abnormal range.
0	FAN1_RT	R	0	A one indicates FAN1 is at abnormal range.

7.6.3.21 VIN_FAULT Mode Register 3 — Index 39h

Bit	Name	R/W	Default	Description
7	VIN7F_SEL	R/W	0	Set to 1, VIN7_ID value will not change until REG 3Ah Bit7 is cleared if that bit is set. Set to 0, VIN7_ID value changes dynamically according to current voltage which falls on which segments (REGD0h ~ REGD6h).
6-4	Reserved	-	-	Reserved.
3	VIN4F_SEL	R	0	Set to 1, once VIN4_FAULT is asserted, it will not be de-asserted when VIN4 is back to normal range. Set to 0, VIN4_FAULT is asserted/de-asserted according to its value whether is out of high/low limit.
2	VIN3F_SEL	R	0	Set to 1, once VIN3_FAULT is asserted, it will not be de-asserted when VIN4 is back to normal range. Set to 0, VIN3_FAULT is asserted/de-asserted according to its value whether is out of high/low limit.
1	VIN2F_SEL	R	0	Set to 1, once VIN2_FAULT is asserted, it will not be de-asserted when VIN4 is back to normal range. Set to 0, VIN2_FAULT is asserted/de-asserted according to its value whether is out of high/low limit.
0	VIN1F_SEL	R	0	Set to 1, once VIN1_FAULT is asserted, it will not be de-asserted when VIN4 is back to normal range. Set to 0, VIN1_FAULT is asserted/de-asserted according to its value whether is out of high/low limit.

7.6.3.22 VIN_FAULT STATUS Register — Index 3Ah

Bit	Name	R/W	Default	Description
7	STS_VIN7_CHG	R/W	0	Read one indicates that the VIN7_ID is changed. Write 1 to clear this status.
6-4	Reserved	-	-	Reserved.
3	STS_VIN4_FAULT	R/W	0	Read one indicates that VIN4 is out of its high/low limit. Write 1 to clear this status.
2	STS_VIN3_FAULT	R/W	0	Read one indicates that VIN3 is out of its high/low limit. Write 1 to clear this status.
1	STS_VIN2FAULT	R/W	0	Read one indicates that VIN2 is out of its high/low limit. Write 1 to clear this status.
0	STS_VIN1_FAULT	R/W	0	Read one indicates that VIN1 is out of its high/low limit. Write 1 to clear this status.

7.6.3.23 T_FAULT Control Register — Index 3Bh

Bit	Name	R/W	Default	Description
7-3	Reserved	-	-	Reserved.

2	EN_T3_FAULT	R/W	0	Set to 1, enable temperature 3(VT3)fault through pin OVT_N.
1	EN_T2_FAULT	R/W	0	Set to 1, enable temperature 2(VT2) fault through pin OVT_N.
0	EN_T1_FAULT	R/W	0	Set to 1, enable temperature 1(VT1) fault through pin OVT_N.

7.6.3.24 Reserved Register — Index 3Ch

Bit	Name	R/W	Default	Description
7-0	Reserved	-	-	Reserved.

7.6.3.25 FAN1 OPERATING Control Register -- Index 60h

Bit	Name	R/W	Default	Description
7	FAN1_SKIP	R	-	When this bit is set to 1, FAN1 is not monitored. When this bit is set to 0, FAN1 is monitored.
6	Reserved	-	-	Reserved.
5	FAN1_FORCE_MONITOR	R/W	0	Set to 1, FAN1 speed is monitored every monitor cycle even the fan is stopped. Set to 0, FAN1 speed will not be monitored at the next monitor cycle if the fan is stopped.
4	FAN1_DC_MODE	R/W	0	Set to 1, FAN1 control is set to DC mode. Set to 0, FAN1 control is set to PWM duty-cycle mode.
3	F1_LATCH_FULL	R/W	0	Set to 1, current FAN1 COUNT will be bypass to FAN1_FULL_SPEED.
2	F1_KEEP_STOP	R/W	0	Set to 1, keep FANPWM1 duty-cycle decrease to STOP DUTY and hold.
1-0	F1_MODE	R/W	00	**00:** FAN1 operates in **SPEED** mode. FANPWM duty-cycle is automatically adjusted according to FAN EXPECT register. **01:** FAN1 operates in **TEMPERATURE** mode. FANPWM duty-cycle is automatically adjusted according to current temperature, **1x:** FAN1 operates in **MANUAL** mode. Software set the FANPWM duty-cycle directly.

7.6.3.26 FANPWM1 START UP DUTY-CYCLE — Index 61h

Bit	Name	R/W	Default	Description
7-0	F1_START_DUTY[9:2]	R/W	30h	FANPWM1 will increasing duty-cycle from 0 to this valuedirectly.

7.6.3.27 FANPWM1 STOP DUTY-CYCLE — Index 62h

Bit	Name	R/W	Default	Description
7-0	F1_STOP_DUTY[9:2]	R/W	25h	FANPWM1 will decreasing duty-cycle to 0 from this value directly or keep duty-cycle in this value when FAN1_KEEP_STOP set to 1.

7.6.3.28 FANPWM1 Output Frequency Control — Index 63h

Bit	Name	R/W	Default	Description

7	PWM1_DIV[7]	R/W	80h	Set to 1, PRECLK(Pre-Clock) = 48M Hz ; Set to 0, PRECLK = 1M Hz .
6-0	PWM1_DIV[6:0]	R/W		Pre-divisor of PRECLK. Set the value to 0 Pre-divisor =1 Set the value to 1 Pre-divisor =1 Set the value to 2 Pre-divisor =2 Set the value to 3 Pre-divisor =3 .....

FANPWM1 output frequency = $\frac{PRECLK}{(\Pr e\text{-}divisor) * 256}$

So, PWM frequency ranges from 30.5Hz~ 187.5KHz

7.6.3.29 FANPWM1 STEP Control Register -- Index 64h

Bit	Name	R/W	Default	Description
7-4	F1_UP_STEP	R/W	00h	This value determines the increasing speed of PWM1_DUTY.
3-0	F1_DOWN_STEP	R/W		This value determines the decreasing speed of PWM1_DUTY.

7.6.3.30 FAN1_FAULT TIME Register — Index 65h

Bit	Name	R/W	Default	Description
7-0	F1_FAULT_TIME	R/W	03h	This register determines the time for fan to chase to the expect speed. 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. (2). When PWM_Duty reaches 00h, if the fan speed count can't reach the fan expect count in the time. The unit of this register is 1 second. The default value is 3 seconds.

7.6.3.31 FAN1 Expect count Register---Index 69h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	00h	
3-0	F1_EXPECT (MSB)	R		User expect fan1 count value, program this register to control the expect fan1 speed

7.6.3.32 FAN1 Expect count Register-- Index 6Ah

PBit	Name	R/W	Default	Description
7-0	F1_EXPECT (LSB)	R	00h	User expect fan1 count value, program this register to control the expect fan1 speed.

7.6.3.33 FAN1 PWM_DUTY -- Index 6Bh

Bit	Name	R/W	Default	Description

7-0	PWM_DUTY1	R/W	FFh	When FAN1 control is at PWM Duty-cycle mode, this value represents the duty-cycle. When FAN1 control is at DC mode, this value represents the DC voltage output. Each step (LSB) is VCC / 256. This register is programmable at Manual mode. At SPEED or TEMPERATURE mode, this register reflects current FANPWM1 duty-cycle.

7.6.3.34 FAN2 OPERATING Control Register -- Index 70h

Bit	Name	R/W	Default	Description
7	FAN2_SKIP	R	-	When this bit is set to 1, FAN2 is not monitored. When this bit is set to 0, FAN2 is monitored.
6	Reserved	-	-	Reserved.
5	FAN2_FORCE_MONITOR	R/W	0	Set to 1, FAN2 speed is monitored every monitor cycle even the fan is stopped. Set to 0, FAN2 speed will not be monitored at the next monitor cycle if the fan is stopped.
4	FAN2_DC_MODE	R/W	0	Set to 1, FAN2 control is set to DC mode. Set to 0, FAN2 control is set to PWM duty-cycle mode.
3	F2_LATCH_FULL	R/W	0	Set to 1, current FAN2 COUNT will be bypass to F2_FULL_SPEED.
2	F2_KEEP_STOP	R/W	0	Set to 1, keep FANPWM2 duty-cycle decrease to STOP DUTY and hold.
1-0	F2_MODE	R/W	00	**00:** FAN2 operates in **SPEED** mode. FANPWM duty-cycle is automatically adjusted according to FAN EXPECT register. **01:** FAN2 operates in **TEMPERATURE** mode. FANPWM duty-cycle is automatically adjusted according to current temperature, **1x:** FAN2 operates in **MANUAL** mode. Software set the FANPWM duty-cycle directly.

7.6.3.35 FANPWM2 START UP DUTY-CYCLE — Index 71h

Bit	Name	R/W	Default	Description
7-0	F2_START_DUTY	R/W	30h	FANPWM2 will increase duty-cycle from 0 to this value directly.

7.6.3.36 FANPWM2 STOP DUTY-CYCLE — Index 72h

Bit	Name	R/W	Default	Description
7-0	F2_STOP_DUTY	R/W	25h	FANPWM2 will decreasing duty-cycle to 0 from this value directly or keep duty-cycle in this value when F2_KEEP_STOP set to 1.

7.6.3.37 FANPWM2 Output Frequency Control — Index 73h

Bit	Name	R/W	Default	Description
7	PWM2_DIV[7]	R/W	80h	Set to 1, PRECLK(Pre-Clock) = 48M Hz ; Set to 0, PRECLK = 1M Hz .

6-0	PWM2_DIV[6:0]	R/W		Pre-divisor of PRECLK. Set the value to 0 Pre-divisor =1 Set the value to 1 Pre-divisor =1 Set the value to 2 Pre-divisor =2 Set the value to 3 Pre-divisor =3 .....

FANPWM2 output frequency = $\frac{PRECLK}{(\Pr e - divisor) * 256}$

So, PWM frequency ranges from 30.5Hz~ 187.5KHz

7.6.3.38 FANPWM2 STEP Control Register -- Index 74h

Bit	Name	R/W	Default	Description
7-4	2_UP_STEP	R/W	00h	This value determines the increasing speed of PWM2_DUTY.
3-0	2_DOWN_STEP	R/W		This value determines the decreasing speed of PWM2_DUTY

7.6.3.39 FAN2_FAULT TIME Register — Index 75h

Bit	Name	R/W	Default	Description
7-0	F2_FAULT_TIME	R/W	03h	This register determines the time for fan to chase to the expect speed. 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. (2). When PWM_Duty reaches 00h, if the fan speed count can't reach the fan expect count in the time. The unit of this register is 1 second. The default value is 180 seconds.

7.6.3.40 FAN2 Expect count Register-- Index 79h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	00h	Reserved.
3-0	F2_EXPECT (MSB)	R		User expect fan2 count value, program this register to control the expect fan2 speed

7.6.3.41 FAN2 Expect count Register-- Index 7Ah

Bit	Name	R/W	Default	Description
7-0	F2_EXPECT (LSB)	R	00h	User expect fan2 count value, program this register to control the expect fan2 speed.

7.6.3.42 FAN2 PWM_DUTY -- Index 7Bh

Bit	Name	R/W	Default	Description

7-0	PWM_DUTY2	R/W	FFh	When FAN2 control is at PWM Duty-cycle mode, this value represents the duty-cycle. When FAN2 control is at DC mode, this value represents the DC voltage output. Each step (LSB) is VCC / 256. This register is programmable at Manual mode. At SPEED or TEMPERATURE mode, this register reflects current FANPWM1 duty-cycle.

7.6.3.43 FAN3 OPERATING Control Register -- Index 80h

Bit	Name	R/W	Default	Description
7	FAN3_SKIP	R	-	When this bit is set to 1, FAN3 is not monitored. When this bit is set to 0, FAN3 is monitored.
6	Reserved	-	-	Reserved.
5	FAN3_FORCE_MONITOR	R/W	0	Set to 1, FAN3 speed is monitored every monitor cycle even the fan is stopped. Set to 0, FAN3 speed will not be monitored at the next monitor cycle if the fan is stopped.
4	FAN3_DC_MODE	R/W	0	Set to 1, FAN3 control is set to DC mode. Set to 0, FAN3 control is set to PWM duty-cycle mode.
3	F3_LATCH_FULL	R/W	0	Set to 1, current FAN3 COUNT will be bypass to F3_FULL_SPEED.
2	F3_KEEP_STOP	R/W	0	Set to 1, keep FANPWM3 duty-cycle decrease to STOP DUTY and hold.
1-0	F3_MODE	R/W	00	**00:** FAN3 operates in **SPEED** mode. FANPWM3 duty-cycle is automatically adjusted according to FAN EXPECT register. **01:** FAN3 operates in **TEMPERATURE** mode. FANPWM3 duty-cycle is automatically adjusted according to current temperature, **1x:** FAN3 operates in **MANUAL** mode. Software set the FANPWM3 duty-cycle directly.

7.6.3.44 FANPWM3 START UP DUTY-CYCLE — Index 81h

Bit	Name	R/W	Default	Description
7-0	F3_START_DUTY	R/W	30h	FANPWM3 will increase duty-cycle from 0 to this value directly.

7.6.3.45 FANPWM3 STOP DUTY-CYCLE — Index 82h

Bit	Name	R/W	Default	Description
7-0	F3_STOP_DUTY	R/W	25h	FANPWM3 will decreasing duty-cycle to 0 from this value directly or keep duty-cycle in this value when F3_KEEP_STOP set to 1.

7.6.3.46 FANPWM3 Output Frequency Control — Index 83h

Bit	Name	R/W	Default	Description
7	PWM3_DIV[7]	R/W	80h	Set to 1, PRECLK(Pre-Clock) = 48M Hz ; Set to 0, PRECLK = 1M Hz .

6-0	PWM3_DIV[6:0]	R/W		Pre-divisor of PRECLK. Set the value to 0 Pre-divisor =1 Set the value to 1 Pre-divisor =1 Set the value to 2 Pre-divisor =2 Set the value to 3 Pre-divisor =3 .....

FANPWM3 output frequency = $\frac{PRECLK}{(\Pr e - divisor) * 256}$

So, PWM frequency ranges from 30.5Hz~ 187.5KHz

7.6.3.47 FANPWM3 STEP Control Register -- Index 84h

Bit	Name	R/W	Default	Description
7-4	F3_UP_STEP	R/W	00h	This value determines the increasing speed of PWM3_DUTY.
3-0	F3_DOWN_STEP	R/W		This value determines the decreasing speed of PWM3_DUTY

7.6.3.48 FAN3_FAULT TIME Register — Index 85h

Bit	Name	R/W	Default	Description
7-0	F3_FAULT_TIME	R/W	03h	This register determines the time for fan to chase to the expect speed. 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. (2). When PWM_Duty reaches 00h, if the fan speed count can't reach the fan expect count in the time. The unit of this register is 1 second. The default value is 180 seconds.

7.6.3.49 FAN3 Expect count Register-- Index 89h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	00h	
3-0	F3_EXPECT (MSB)	R		User expect fan3 count value, program this register to control the expect fan3 speed

7.6.3.50 FAN3 Expect count Register-- Index 8Ah

Bit	Name	R/W	Default	Description
7-0	F3_EXPECT (LSB)	R	00h	User expect fan3 count value, program this register to control the expect fan3 speed.

7.6.3.51 FAN3 PWM_DUTY -- Index 8Bh

Bit	Name	R/W	Default	Description

7-0	PWM_DUTY3	R/W	FFh	When FAN3 control is at PWM Duty-cycle mode, this value represents the duty-cycle. When FAN3 control is at DC mode, this value represents the DC voltage output. Each step (LSB) is VCC / 256. This register is programmable at Manual mode. At SPEED or TEMPERATURE mode, this register reflects current FANPWM1 duty-cycle

7.6.3.52 T1 OFFSET Register -- Index 90h

Bit	Name	R/W	Default	Description
7	Reserved	-	00h	
6-0	T1OFFSET	R/W		T1 temperature offset register. The real temperature value will be added by this offset and then will be put into temperature reading (Value RAM 1Bh). The offset ranges from -64ºC to 63ºC. 3Fh : +63ºC. 01h : +1ºC. 00h : +0ºC. 7Fh: -1ºC 7Eh: -2ºC 40h: -64ºC

7.6.3.53 T2 OFFSET Register -- Index 91h

Bit	Name	R/W	Default	Description
7	Reserved	-	00h	
6-0	T2OFFSET	R/W		T2 temperature offset register. The real temperature value will be added by this offset and then will be put into temperature reading (Value RAM 1Ch). The offset ranges from -64ºC to 63ºC. 3Fh : +63ºC. 01h : +1ºC. 00h : +0ºC. 7Fh: -1ºC 7Eh: -2ºC 40h: -64ºC

7.6.3.54 T3 OFFSET Register -- Index 92h

Bit	Name	R/W	Default	Description
7	Reserved	-	00h	Reserved.
6-0	T3OFFSET	R/W		T3 temperature offset register. The real temperature value will be added by this offset and then will be put into temperature reading (Value RAM 1Dh). The offset ranges from -64ºC to 63ºC. 3Fh : +63ºC. 01h : +1ºC. 00h : +0ºC. 7Fh: -1ºC 7Eh: -2ºC 40h: -64ºC

7.6.3.55 FAN1 CONTROL v.s. TEMPERATURE 1 (INDEX A0 -- AD registers)

T1 BOUNDARY 1 TEMPERATURE – Index A0h

Bit	Name	R/W	Default	Description
7-0	T1_TP_1	R/W	00h	The 1st BOUNDARY temperature for T1 in temperature mode. When T1 temperature is **exceed** this boundary, FAN1 segment **1** speed count registers will be loaded into FAN1 expect count registers. When T1 temperature is **below** this boundary, FAN1 segment **2** speed count registers will be loaded into FAN1 expect count registers.

T1 BOUNDARY 5 TEMPERATURE – Index A1h

Bit	Name	R/W	Default	Description
7-0	T1_TP_5	R/W	00h	The 5th BOUNDARY temperature for T1 in temperature mode. When T1 temperature is **exceed** this boundary, FAN1 segment 5 speed count registers will be loaded into FAN1 expect count registers. When T1 temperature is **below** this boundary, FAN1 segment 6 speed count registers will be loaded into FAN1 expect count registers.

T1 BOUNDARY 9 TEMPERATURE – Index A2h

Bit	Name	R/W	Default	Description
7-0	T1_TP_9	R/W	00h	The 9th BOUNDARY temperature for T1 in temperature mode. When T1 temperature is **exceed** this boundary, FAN1 segment 9 speed count registers will be loaded into FAN1 expect count registers. When T1 temperature is **below** this boundary, FAN1 segment 10 speed count registers will be loaded into FAN1 expect count registers.

FAN1 SEGMENT 1 SPEED COUNT (MSB) – Index A4h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	
3-0	T1_SP_1_MSB	R/W	Fh	The MSB of 1st expected fan speed for FAN1 in temperature mode.

FAN1 SEGMENT 1 SPEED COUNT (LSB) – Index A5h

Bit	Name	R/W	Default	Description
7-0	T1_SP_1_LSB	R/W	FFh	The LSB of 1st expected fan speed for FAN1 in temperature mode.

FAN1 SEGMENT 5 SPEED COUNT (MSB) – Index A6h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	
3-0	T1_SP_5_MSB	R/W	Fh	The MSB of 5th expected fan speed for FAN1 in temperature mode.

FAN1 SEGMENT 5 SPEED COUNT (LSB) – Index A7h

Bit	Name	R/W	Default	Description
7-0	T1_SP_5_LSB	R/W	FFh	The LSB of 5th expected fan speed for FAN1 in temperature mode.

FAN1 SEGMENT 9 SPEED COUNT (MSB) – Index A8h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	
3-0	T1_SP_9_MSB	R/W	Fh	The MSB of 9th expected fan speed for FAN1 in temperature mode.

FAN1 SEGMENT 9 SPEED COUNT (LSB) – Index A9h

Bit	Name	R/W	Default	Description
7-0	T1_SP_9_LSB	R/W	FFh	The LSB of 9th expected fan speed for FAN1 in temperature mode.

7.6.3.56 FAN2 CONTROL v.s. TEMPERATURE 2 (INDEX B0 -- BD registers)

T2 BOUNDARY 1 TEMPERATURE – Index B0h

Bit	Name	R/W	Default	Description
7-0	T2_TP_1	R/W	00h	The 1st BOUNDARY temperature for T2 in temperature mode. When T2 temperature is **exceed** this boundary, FAN2 segment **1** speed count registers will be loaded into FAN2 expect count registers. When T2 temperature is **below** this boundary, FAN2 segment **2** speed count registers will be loaded into FAN2 expect count registers.

T2 BOUNDARY 5 TEMPERATURE – Index B1h

Bit	Name	R/W	Default	Description
7-0	T2_TP_5	R/W	00h	The 5th BOUNDARY temperature for T2 in temperature mode. When T2 temperature is **exceed** this boundary, FAN2 segment 5 speed count registers will be loaded into FAN2 expect count registers. When T2 temperature is **below** this boundary, FAN2 segment 6 speed count registers will be loaded into FAN2 expect count registers.

T2 BOUNDARY 9 TEMPERATURE – Index B2h

Bit	Name	R/W	Default	Description
7-0	T2_TP_9	R/W	00h	The 9th BOUNDARY temperature for T2 in temperature mode. When T2 temperature is **exceed** this boundary, FAN2 segment 9 speed count registers will be loaded into FAN2 expect count registers. When T2 temperature is **below** this boundary, FAN2 segment 10 speed count registers will be loaded into FAN2 expect count registers.

FAN2 SEGMENT 1 SPEED COUNT (MSB) – Index B4h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	
3-0	T2_SP_1_MSB	R/W	Fh	The MSB of 1st expected fan speed for FAN2 in temperature mode.

FAN2 SEGMENT 1 SPEED COUNT (LSB) – Index B5h

Bit	Name	R/W	Default	Description
7-0	T2_SP_1_LSB	R/W	FFh	The LSB of 1st expected fan speed for FAN2 in temperature mode.

FAN2 SEGMENT 5 SPEED COUNT (MSB) – Index B6h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	
3-0	T2_SP_5_MSB	R/W	Fh	The MSB of 5th expected fan speed for FAN2 in temperature mode.

FAN2 SEGMENT 5 SPEED COUNT (LSB) – Index B7h

Bit	Name	R/W	Default	Description
7-0	T2_SP_5_LSB	R/W	FFh	The LSB of 5th expected fan speed for FAN2 in temperature mode.

FAN2 SEGMENT 9 SPEED COUNT (MSB) – Index B8h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	
3-0	T2_SP_9_MSB	R/W	Fh	The MSB of 9th expected fan speed for FAN2 in temperature mode.

FAN2 SEGMENT 9 SPEED COUNT (LSB) – Index B9h

Bit	Name	R/W	Default	Description
7-0	T2_SP_9_LSB	R/W	FFh	The LSB of 9th expected fan speed for FAN2 in temperature mode.

7.6.3.57 FAN3 CONTROL v.s. TEMPERATURE 3 (INDEX C0 -- CD registers)

T3 BOUNDARY 1 TEMPERATURE – Index C0h

Bit	Name	R/W	Default	Description
7-0	T3_TP_1	R/W	00h	The 1st BOUNDARY temperature for T3 in temperature mode. When T3 temperature is **exceed** this boundary, FAN3 segment **1** speed count registers will be loaded into FAN3 expect count registers. When T3 temperature is **below** this boundary, FAN3 segment **2** speed count registers will be loaded into FAN3 expect count registers.

T3 BOUNDARY 5 TEMPERATURE – Index C1h

Bit	Name	R/W	Default	Description
7-0	T3_TP_5	R/W	00h	The 5th BOUNDARY temperature for T3 in temperature mode. When T3 temperature is **exceed** this boundary, FAN3 segment 5 speed count registers will be loaded into FAN3 expect count registers. When T3 temperature is **below** this boundary, FAN3 segment 6 speed count registers will be loaded into FAN3 expect count registers.

T3 BOUNDARY 9 TEMPERATURE – Index C2h

Bit	Name	R/W	Default	Description
7-0	T3_TP_9	R/W	00h	The 9th BOUNDARY temperature for T3 in temperature mode. When T3 temperature is **exceed** this boundary, FAN3 segment 9 speed count registers will be loaded into FAN3 expect count registers. When T3 temperature is **below** this boundary, FAN3 segment 10 speed count registers will be loaded into FAN3 expect count registers.

FAN3 SEGMENT 1 SPEED COUNT (MSB) – Index C4h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	
3-0	T3_SP_1_MSB	R/W	Fh	The MSB of 1st expected fan speed for FAN3 in temperature mode.

FAN3 SEGMENT 1 SPEED COUNT (LSB) – Index C5h

Bit	Name	R/W	Default	Description
7-0	T3_SP_1_LSB	R/W	FFh	The LSB of 1st expected fan speed for FAN3 in temperature mode.

FAN3 SEGMENT 5 SPEED COUNT (MSB) – Index C6h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	
3-0	T3_SP_5_MSB	R/W	Fh	The MSB of 5th expected fan speed for FAN3 in temperature mode.

FAN3 SEGMENT 5 SPEED COUNT (LSB) – Index C7h

Bit	Name	R/W	Default	Description
7-0	T3_SP_5_LSB	R/W	FFh	The LSB of 5th expected fan speed for FAN1 in temperature mode.

FAN3 SEGMENT 9 SPEED COUNT (MSB) – Index C8h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	-	
3-0	T3_SP_9_MSB	R/W	Fh	The MSB of 9th expected fan speed for FAN3 in temperature mode.

FAN3 SEGMENT 9 SPEED COUNT (LSB) – Index C9h

Bit	Name	R/W	Default	Description
7-0	T3_SP_9_LSB	R/W	FFh	The LSB of 9th expected fan speed for FAN3 in temperature mode.

7.6.3.58 VIN7 SEGMENT 0 – Index D0h

Bit	Name	R/W	Default	Description
7-0	VIN7_SEG0	R/W	00h	The 1rd mark to denote VIN7's value.

7.6.3.59 VIN7 SEGMENT 1 – Index D1h

Bit	Name	R/W	Default	Description
7-0	VIN7_SEG1	R/W	00h	The 2rd mark to denote VIN7's value.

7.6.3.60 VIN7 SEGMENT 2 – Index D2h

Bit	Name	R/W	Default	Description
7-0	VIN7_SEG2	R/W	00h	The 3rd mark to denote VIN7's value.

7.6.3.61 VIN7 SEGMENT 3 – Index D3h

Bit	Name	R/W	Default	Description
7-0	VIN7_SEG3	R/W	00h	The 4th mark to denote VIN7's value.

7.6.3.62 VIN7 SEGMENT 4 – Index D4h

Bit	Name	R/W	Default	Description
7-0	VIN7_SEG4	R/W	00h	The 5th mark to denote VIN7's value.

7.6.3.63 VIN7 SEGMENT 5 – Index D5h

Bit	Name	R/W	Default	Description
7-0	VIN7_SEG5	R/W	00h	The 6th mark to denote VIN7's value.

7.6.3.64 VIN7 SEGMENT 6 – Index D6h

Bit	Name	R/W	Default	Description
7-0	VIN7_SEG6	R/W	00h	The 7th mark to denote VIN7's value.

7.7 GPIO Register

7.7.1 Logic Device Number Register

Logic Device Number Register — Index 07h

Bit	Name	R/W	Default	Description
7-0	LDN	R/W	00h	00h: Select FDC device configuration registers. 01h: Select UART 1 device configuration registers. 02h: Select UART 2 device configuration registers. 03h: Select Parallel Port device configuration registers. 04h: Select Hardware Monitor device configuration registers. 06h: Select GPIO device configuration registers. 0ah: Select PME device configuration registers. Otherwise: reserved.

7.7.2 GPIO Configuration Registers

7.7.2.1 IRQ Channel Select Register — Index 70h

Bit	Name	R/W	Default	Description
7-4	Reserved	-	0	Reserved.
3-0	SELGIOIRQ	R/W	0h	Select the IRQ channel for GP00, GP01, GP02, GP03, GP04, GP05, GP06 and GP07 interrupt.

7.7.2.2 GP0 Output Enable Register — Index E0h

Bit	Name	R/W	Default	Description
7	GP07_OE	R/W	0	0: GP07 is in input mode. 1: GP07 is in output mode.
6	GP06_OE	R/W	0	0: GP06 is in input mode. 1: GP06 is in output mode.
5	GP05_OE	R/W	0	0: GP05 is in input mode. 1: GP05 is in output mode.
4	GP04_OE	R/W	0	0: GP04 is in input mode. 1: GP04 is in output mode.
3	GP03_OE	R/W	0	0: GP03 is in input mode. 1: GP03 is in output mode.
2	GP02_OE	R/W	0	0: GP02 is in input mode. 1: GP02 is in output mode.
1	GP01_OE	R/W	0	0: GP01 is in input mode. 1: GP01 is in output mode.
0	GP00_OE	R/W	0	0: GP00 is in input mode. 1: GP00 is in output mode.

7.7.2.3 GP0 Output Data Register — Index E1h

Bit	Name	R/W	Default	Description
7	GP07_VAL	R/W	0	0: GP07 outputs 0 when in output mode. 1: GP07 outputs1 when in output mode and GP07_MODE is 0. GP07 outputs a pulse when in output mode and GP07_MODE is 1. Auto clear after the pulse.
6	GP06_VAL	R/W	0	0: GP06 outputs 0 when in output mode. 1: GP06 outputs1 when in output mode and GP06_MODE is 0. GP06 outputs a pulse when in output mode and GP06_MODE is 1. Auto clear after the pulse.
5	GP05_VAL	R/W	0	0: GP05 outputs 0 when in output mode. 1: GP05 outputs 1 when in output mode and GP05_MODE is 0. GP05 outputs a pulse when in output mode and GP05_MODE is 1. Auto clear after the pulse.
4	GP04_VAL	R/W	0	0: GP04 outputs 0 when in output mode. 1: GP04 outputs 1 when in output mode and GP04_MODE is 0. GP04 outputs a pulse when in output mode and GP04_MODE is 1. Auto clear after the pulse.
3	GP03_VAL	R/W	0	0: GP03 outputs 0 when in output mode. 1: GP03 outputs 1 when in output mode and GP03_MODE is 0. GP03 outputs a pulse when in output mode and GP03_MODE is 1. Auto clear after the pulse.
2	GP02_VAL	R/W	0	0: GP02 outputs 0 when in output mode. 1: GP02 outputs 1 when in output mode and GP02_MODE is 0. GP02 outputs a pulse when in output mode and GP02_MODE is 1. Auto clear after the pulse.
1	GP01_VAL	R/W	0	0: GP01 outputs 0 when in output mode. 1: GP01 outputs 1 when in output mode and GP01_MODE is 0. GP01 outputs a pulse when in output mode and GP01_MODE is 1. Auto clear after the pulse.
0	GP00_VAL	R/W	0	0: GP00 outputs 0 when in output mode. 1: GP00 outputs 1 when in output mode and GP00_MODE is 0. GP00 outputs a pulse when in output mode and GP00_MODE is 1. Auto clear after the pulse.

7.7.2.4 GP0 Pin Status Register — Index E2h

Bit	Name	R/W	Default	Description
7	GP07_IN	R	-	The pin status of GP07.
6	GP06_IN	R	-	The pin status of GP06/VIN7_ID2.
5	GP05_IN	R	-	The pin status of GP05/VIN7_ID1.
4	GP04_IN	R	-	The pin status of GP04/VIN7_ID0.
3	GP03_IN	R	-	The pin status of GP03/Voltage_fault4.
2	GP02_IN	R	-	The pin status of GP02/Voltage_fault3.
1	GP01_IN	R	-	The pin status of GP01/Voltage_fault2.
0	GP00_IN	R	-	The pin status of GP00/Voltage_fault1.

7.7.2.5 GP0 Output Mode Register — Index E3h

Bit	Name	R/W	Default	Description
7	GP07_MODE	R/W	0	0: level mode, GP07 output is controlled by GP07_VAL. 1: pulse mode, write GP07_VAL 1 to generate a pulse via GP07.
6	GP06_MODE	R/W	0	0: level mode, GP06 output is controlled by GP06_VAL. 1: pulse mode, write GP06_VAL 1 to generate a pulse via GP06.
5	GP05_MODE	R/W	0	0: level mode, GP05 output is controlled by GP05_VAL. 1: pulse mode, write GP05_VAL 1 to generate a pulse via GP05.
4	GP04_MODE	R/W	0	0: level mode, GP04 output is controlled by GP04_VAL. 1: pulse mode, write GP04_VAL 1 to generate a pulse via GP04.
3	GP03_MODE	R/W	0	0: level mode, GP03 output is controlled by GP03_VAL. 1: pulse mode, write GP03_VAL 1 to generate a pulse via GP03.
2	GP02_MODE	R/W	0	0: level mode, GP02 output is controlled by GP02_VAL. 1: pulse mode, write GP02_VAL 1 to generate a pulse via GP02.
1	GP01_MODE	R/W	0	0: level mode, GP01 output is controlled by GP01_VAL. 1: pulse mode, write GP01_VAL 1 to generate a pulse via GP01.
0	GP00_MODE	R/W	0	0: level mode, GP00 output is controlled by GP00_VAL. 1: pulse mode, write GP00_VAL 1 to generate a pulse via GP00.

7.7.2.6 GP0 Pulse Width Select 1 Register — Index E4h

Bit	Name	R/W	Default	Description
7-6	GP03_PW_SEL	R/W	00	GP03 pulse width select: 00: 500us (default). 01: 1ms. 10: 20ms. 11: 100ms.
5-4	GP02_PW_SEL	R/W	00	GP02 pulse width select: 00: 500us (default). 01: 1ms. 10: 20ms. 11: 100ms.
3-2	GP01_PW_SEL	R/W	00	GP01 pulse width select: 00: 500us (default). 01: 1ms. 10: 20ms. 11: 100ms.
1-0	GP00_PW_SEL	R/W	00	GP00 pulse width select: 00: 500us (default). 01: 1ms. 10: 20ms. 11: 100ms.

7.7.2.7 GP0 Pulse Width Select 2 Register — Index E5h

Bit	Name	R/W	Default	Description

7-6	GP07_PW_SEL	R/W	00	GP07 pulse width select: 00: 500us (default). 01: 1ms. 10: 20ms. 11: 100ms.
5-4	GP06_PW_SEL	R/W	00	GP06 pulse width select: 00: 500us (default). 01: 1ms. 10: 20ms. 11: 100ms.
3-2	GP05_PW_SEL	R/W	00	GP05 pulse width select: 00: 500us (default). 01: 1ms. 10: 20ms. 11: 100ms.
1-0	GP04_PW_SEL	R/W	00	GP04 pulse width select: 00: 500us (default). 01: 1ms. 10: 20ms. 11: 100ms.

7.7.2.8 GP0 Pulse Mode Register — Index E6h

Bit	Name	R/W	Default	Description
7	GP07_PUL_MODE	R/W	0	GP07 pulse mode: 0: output low pulse when in pulse mode. 1: output high pulse when in pulse mode.
6	GP06_PUL_MODE	R/W	0	GP06 pulse mode: 0: output low pulse when in pulse mode. 1: output high pulse when in pulse mode.
5	GP05_PUL_MODE	R/W	0	GP05 pulse mode: 0: output low pulse when in pulse mode. 1: output high pulse when in pulse mode.
4	GP04_PUL_MODE	R/W	0	GP04 pulse mode: 0: output low pulse when in pulse mode. 1: output high pulse when in pulse mode.
3	GP03_PUL_MODE	R/W	0	GP03 pulse mode: 0: output low pulse when in pulse mode. 1: output high pulse when in pulse mode.
2	GP02_PUL_MODE	R/W	0	GP02 pulse mode: 0: output low pulse when in pulse mode. 1: output high pulse when in pulse mode.
1	GP01_PUL_MODE	R/W	0	GP01 pulse mode: 0: output low pulse when in pulse mode. 1: output high pulse when in pulse mode.

0	GP00_PUL_MODE	R/W	0	GP00 pulse mode: 0: output low pulse when in pulse mode. 1: output high pulse when in pulse mode.

7.7.2.9 GP0 Pad Type Register — Index E7h

Bit	Name	R/W	Default	Description
7	GP07_DRV_EN	R/W	0	GP07 pad type: 0: open drain. 1: push-pull.
6	GP06_DRV_EN	R/W	0	GP06 pad type: 0: open drain. 1: push-pull.
5	GP05_DRV_EN	R/W	0	GP05 pad type: 0: open drain. 1: push-pull.
4	GP04_DRV_EN	R/W	0	GP04 pad type: 0: open drain. 1: push-pull.
3	GP03_DRV_EN	R/W	0	GP03 pad type: 0: open drain. 1: push-pull.
2	GP02_DRV_EN	R/W	0	GP02 pad type: 0: open drain. 1: push-pull.
1	GP01_DRV_EN	R/W	0	GP01 pad type: 0: open drain. 1: push-pull.
0	GP00_DRV_EN	R/W	0	GP00 pad type: 0: open drain. 1: push-pull.

7.7.2.10 GP0 IRQ Enable Register — Index E8h

Bit	Name	R/W	Default	Description
7	GP07_IRQ_EN	R/W	0	GP07 interrupt enable: 0: disable interrupt. 1: assert an interrupt when GP07 changed in input mode.
6	GP06_IRQ_EN	R/W	0	GP06 interrupt enable: 0: disable interrupt. 1: assert an interrupt when GP06 changed in input mode.
5	GP05_IRQ_EN	R/W	0	GP05 interrupt enable: 0: disable interrupt. 1: assert an interrupt when GP05 changed in input mode.
4	GP04_IRQ_EN	R/W	0	GP04 interrupt enable: 0: disable interrupt. 1: assert an interrupt when GP04 changed in input mode.

3	GP03_IRQ_EN	R/W	0	GP03 interrupt enable: 0: disable interrupt. 1: assert an interrupt when GP03 changed in input mode.
2	GP02_IRQ_EN	R/W	0	GP02 interrupt enable: 0: disable interrupt. 1: assert an interrupt when GP02 changed in input mode.
1	GP01_IRQ_EN	R/W	0	GP01 interrupt enable: 0: disable interrupt. 1: assert an interrupt when GP01 changed in input mode.
0	GP00_IRQ_EN	R/W	0	GP00 interrupt enable: 0: disable interrupt. 1: assert an interrupt when GP00 changed in input mode.

7.7.2.11 GP0 Edge Detect Register — Index E9h

Bit	Name	R/W	Default	Description
7	GP07_EDG	R/W	0	GP07 edge detect: 0: input data does not change. 1: input data changes. Write 1 to clear.
6	GP06_EDG	R/W	0	GP06 edge detect: 0: input data does not change. 1: input data changes. Write 1 to clear.
5	GP05_EDG	R/W	0	GP05 edge detect: 0: input data does not change. 1: input data changes. Write 1 to clear.
4	GP04_EDG	R/W	0	GP04 edge detect: 0: input data does not change. 1: input data changes. Write 1 to clear.
3	GP03_EDG	R/W	0	GP03 edge detect: 0: input data does not change. 1: input data changes. Write 1 to clear.
2	GP02_EDG	R/W	0	GP02 edge detect: 0: input data does not change. 1: input data changes. Write 1 to clear.
1	GP01_EDG	R/W	0	GP01 edge detect: 0: input data does not change. 1: input data changes. Write 1 to clear.
0	GP00_EDG	R/W	0	GP00 edge detect: 0: input data does not change. 1: input data changes. Write 1 to clear.

7.7.2.12 GP1 Output Enable Register — Index F0h

Bit	Name	R/W	Default	Description
7	GP17_OE	R/W	0	0: GP17 is in input mode. 1: GP17 is in output mode.

6	GP16_OE	R/W	0	0: GP16 is in input mode. 1: GP16 is in output mode.
5	GP15_OE	R/W	0	0: GP15 is in input mode. 1: GP15 is in output mode.
4	GP14_OE	R/W	0	0: GP14 is in input mode. 1: GP14 is in output mode.
3	GP13_OE	R/W	0	0: GP13 is in input mode. 1: GP13 is in output mode.
2	GP12_OE	R/W	0	0: GP12 is in input mode. 1: GP12 is in output mode.
1	GP11_OE	R/W	0	0: GP11 is in input mode. 1: GP11 is in output mode.
0	GP10_OE	R/W	0	0: GP10 is in input mode. 1: GP10 is in output mode.

7.7.2.13 GP1 Pin Status Register — Index F1h

Bit	Name	R/W	Default	Description
7	GP17_IN	R	-	The pin status of FA7/GP17.
6	GP16_IN	R	-	The pin status of FA6/GP16.
5	GP15_IN	R	-	The pin status of FA5/GP15.
4	GP14_IN	R	-	The pin status of FA4/GP14.
3	GP13_IN	R	-	The pin status of FA3/GP13.
2	GP12_IN	R	-	The pin status of FA2/GP12.
1	GP11_IN	R	-	The pin status of FA1/GP11.
0	GP10_IN	R	-	The pin status of FA0/GP10.

7.7.2.14 GP2 Output Enable Register — Index F3h

Bit	Name	R/W	Default	Description
7	GP27_OE	R/W	0	0: GP27 is in input mode. 1: GP27 is in output mode.
6	GP26_OE	R/W	0	0: GP26 is in input mode. 1: GP26 is in output mode.
5	GP25_OE	R/W	0	0: GP25 is in input mode. 1: GP25 is in output mode.
4	GP24_OE	R/W	0	0: GP24 is in input mode. 1: GP24 is in output mode.
3	GP23_OE	R/W	0	0: GP23 is in input mode. 1: GP23 is in output mode.
2	GP22_OE	R/W	0	0: GP22 is in input mode. 1: GP22 is in output mode.
1	GP21_OE	R/W	0	0: GP21 is in input mode. 1: GP21 is in output mode.
0	GP20_OE	R/W	0	0: GP20 is in input mode. 1: GP20 is in output mode.

7.7.2.15 GP2 Pin Status Register — Index F4h

Bit	Name	R/W	Default	Description
7	GP27_IN	R	-	The pin status of FA17/GP27.
6	GP26_IN	R	-	The pin status of FA16/GP26.
5	GP25_IN	R	-	The pin status of FA15/GP25.
4	GP24_IN	R	-	The pin status of FA14/GP24.
3	GP23_IN	R	-	The pin status of FA13/GP23.
2	GP22_IN	R	-	The pin status of FA12/GP22.
1	GP21_IN	R	-	The pin status of FA11/GP21.
0	GP20_IN	R	-	The pin status of FA10/GP20.

7.8 PME Register

7.8.1 Logic Device Number Register

Logic Device Number Register — Index 07h

Bit	Name	R/W	Default	Description
7-0	LDN	R/W	00h	00h: Select FDC device configuration registers. 01h: Select UART 1 device configuration registers. 02h: Select UART 2 device configuration registers. 03h: Select Parallel Port device configuration registers. 04h: Select Hardware Monitor device configuration registers. 06h: Select GPIO device configuration registers. 0ah: Select PME device configuration registers. Otherwise: reserved.

7.8.2 PME Configuration Registers

Device Enable Register — Index 30h

Bit	Name	R/W	Default	Description
7-1	Reserved	-	-	Reserved
0	PME_EN	R/W	0	0: disable PME. 1: enable PME.

PME Event Enable Register — Index F0h

Bit	Name	R/W	Default	Description
7-5	Reserved	-	-	Reserved

4	HM_PME_EN	R/W	0	Hardware monitor PME event enable. 0: disable hardware monitor PME event. 1: enable hardware monitor PME event.
3	PRT_PME_EN	R/W	0	Parallel port PME event enable. 0: disable parallel port PME event. 1: enable parallel port PME event.
2	UR2_PME_EN	R/W	0	UART 2 PME event enable. 0: disable UART 2 PME event. 1: enable UART 2 PME event.
1	UR1_PME_EN	R/W	0	UART 1 PME event enable. 0: disable UART 1 PME event. 1: enable UART 1 PME event.
0	FDC_PME_EN	R/W	0	FDC PME event enable. 0: disable FDC PME event. 1: enable FDC PME event.

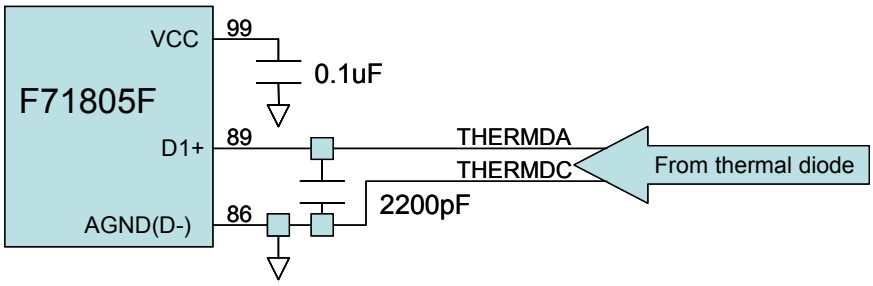
PME Event Status Register — Index F1h

Bit	Name	R/W	Default	Description
7-5	Reserved	-	-	Reserved
4	HM_PME_ST	R/W	0	Hardware monitor PME event status. 0: Hardware monitor has no PME event. 1: Hardware monitor has a PME event to assert. Write 1 to clear to be ready for next PME event.
3	PRT_PME_ST	R/W	0	Parallel port PME event status. 0: Parallel port has no PME event. 1: Parallel port has a PME event to assert. Write 1 to clear to be ready for next PME event.
2	UR2_PME_ST	R/W	0	UART 2 PME event status. 0: UART 2 has no PME event. 1: UART 2 has a PME event to assert. Write 1 to clear to be ready for next PME event.
1	UR1_PME_ST	R/W	0	UART 1 PME event status. 0: UART 1 has no PME event. 1: UART 1 has a PME event to assert. Write 1 to clear to be ready for next PME event.
0	FDC_PME_ST	R/W	0	FDC PME event status. 0: FDC has no PME event. 1: FDC has a PME event to assert. Write 1 to clear to be ready for next PME event.

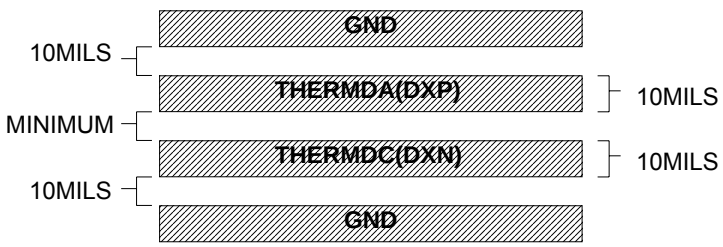
8. PCB Layout Guide

F71805 adopts **Current Mode** measure method to do temperature detected. The measure data will not be affected by different process of CPU due to use current mode technology. This technology measures mini-voltage from the remote sensor so a good PCB layout must be cared about noise minimizing. The noises often come from circuit trace which is a track from remote sensor (CPU side) to detect circuit input (F71805 side). The signal on this track will be inducted mini-noises when it passes through a high electromagnetic area. Those effects will result in the mini-noises and show in the detected side. It will be reported a wrong data which you want to measure. Please pay attention and follow up the check list below in order to get an actual and real temperature inside the chip.

1. The D1+/D2+/D3+ and AGND (D-) tracks **Must Not** pass through/by PWM POWER-MOS. Keep as far as possible from POWER MOS.
2. Place a 0.1μF bypass capacitor close to the V_{CC} pin (Pin# 99). Place an external 2200pF input filter capacitors across D+, D- and close to the F71805. Near the pin AGND (D-) **Must Be** placed a through hole into the GND Plane before connect to the external 2200pF capacitor.



3. Place the F71805 as close as practical to the remote sensor diode. In noisy environments, such as a computer main-board, the distance can be 4 to 8 inches. (typ). This length can be increased if the worst noise sources are avoided. Noise sources generally include clock generators, CRTs, memory buses and PCI/ISA bus etc.
4. Separated route the D1+, D2+ or D3+ with AGND (D-) tracks close together and in parallel after adding external 2200pF capacitor. For more reliable, it had better with grounded guard tracks on each side. Provide a ground plane under the tracks if possible. Do not route D+ & D- lines next to the deflection coil of the CRT. And also don't route the trace across fast digital signals which can easily induce bigger error.



5. Use wide tracks to minimize inductance and reduce noise pickup. 10 mil track minimum width and spacing is recommended.
6. Try to minimize the number of component/solder joints, called through hole, which can cause thermocouple effects. Where through holes are used, make sure that they are in both the D+ and D- path and at the same temperature. Thermocouple effects should not be a major problem as 1℃ corresponds to about 200μV. It means that a copper-solder thermocouple exhibits 3μV/℃, and takes about 200μV of the voltage error at D+ & D- to cause a 1℃ measurement error. Adding a few thermocouples causes a negligible error.
7. If the distance to the remote sensor is more than 8 inches, the use of twisted pair cable is recommended. It will work up to around 6 to 12 feet.

Because the measurement technique uses switched current sources, excessive cable and/or filter capacitance will affect the measurement accuracy. When using long cables, the filter capacitor should be reduced or removed. Cable resistance can also induce errors. For example: 1 Ω series resistance introduces about 0.5℃ error.

9. Electrical characteristic

9.1 Absolute Maximum Ratings

PARAMETER	RATING	UNIT
Power Supply Voltage	-0.5 to 5.5	V
Input Voltage	-0.5 to VDD+0.5	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

9.2 DC Characteristics

(Ta = 0° C to 70° C, VDD = 3.3V ± 10%, VSS = 0V) (Note)

PARAMETER	SYM.	MIN.	TYP.	MAX.	UNIT	CONDITIONS
I/OD_{16ts} - TTL level bi-directional pin, can select to OD by register, with 16 mA source-sink capability						
Input Low Threshold Voltage	Vt-				V	VDD = 3.3 V
Input High Threshold Voltage	Vt+				V	VDD = 3.3 V

Output Low Current	IOL				mA	VOL = 0.4 V
Input High Leakage	ILIH				μA	VIN = VDD
Input Low Leakage	ILIL				μA	VIN = 0V
I/OD_{12ts} - TTL level bi-directional pin, can select to OD by register, with 12 mA source-sink capability						
Input Low Threshold Voltage	Vt-				V	VDD = 3.3 V
Input High Threshold Voltage	Vt+				V	VDD = 3.3 V
Output Low Current	IOL				mA	VOL = 0.4 V
Input High Leakage	ILIH				μA	VIN = VDD
Input Low Leakage	ILIL				μA	VIN = 0V

9.3 AC Characteristics

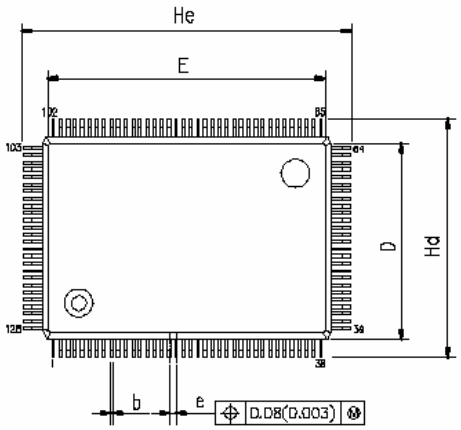
Serial Bus Timing

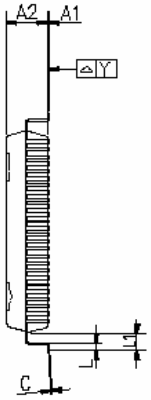
PARAMETER	SYMBOL	MIN.	MAX.	UNIT
SCL clock period	t^{-}_{SCL}			uS
Start condition hold time	$t_{HD;SDA}$			uS
Stop condition setup-up time	$t_{SU;STO}$			uS
DATA to SCL setup time	$t_{SU;DAT}$			nS
DATA to SCL hold time	$t_{HD;DAT}$			nS
SCL and SDA rise time	t_R			uS
SCL and SDA fall time	t_F			nS

10. Ordering Information

Part Number	Package Type	Production Flow
F71805F	128-QFP (Normal)	Commercial, 0°C to +70°C
F71805FG	128-QFP (Green Package)	Commercial, 0°C to +70°C

11. Package Dimensions





SYMBOLS	MIN.	NOM.	MAX.
A1	0.25	0.35	0.45
A2	2.57	2.72	2.87
b	0.10	0.20	0.30
C	0.10	0.15	0.20
D	13.90	14.00	14.10
E	19.90	20.00	20.10
e	–	0.50	–
Hd	17.00	17.20	17.40
He	23.00	23.20	23.40
L	0.65	0.80	0.95
L1	–	1.60	–
Y	–	–	0.08
θ°	0	–	12

UNIT : mm

NOTES:

1.JEDEC OUTLINE:N/A

2.DATUM PLANE [H] IS LOCATED AT THE BOTTOM OF THE MOLD PARTING LINE COINCIDENT WITH WHERE THE LEAD EXITS THE BODY.

3.DIMENSIONS E AND D DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 mm PER SIDE. DIMENSIONS E AND E DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE [H].

4.DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION .

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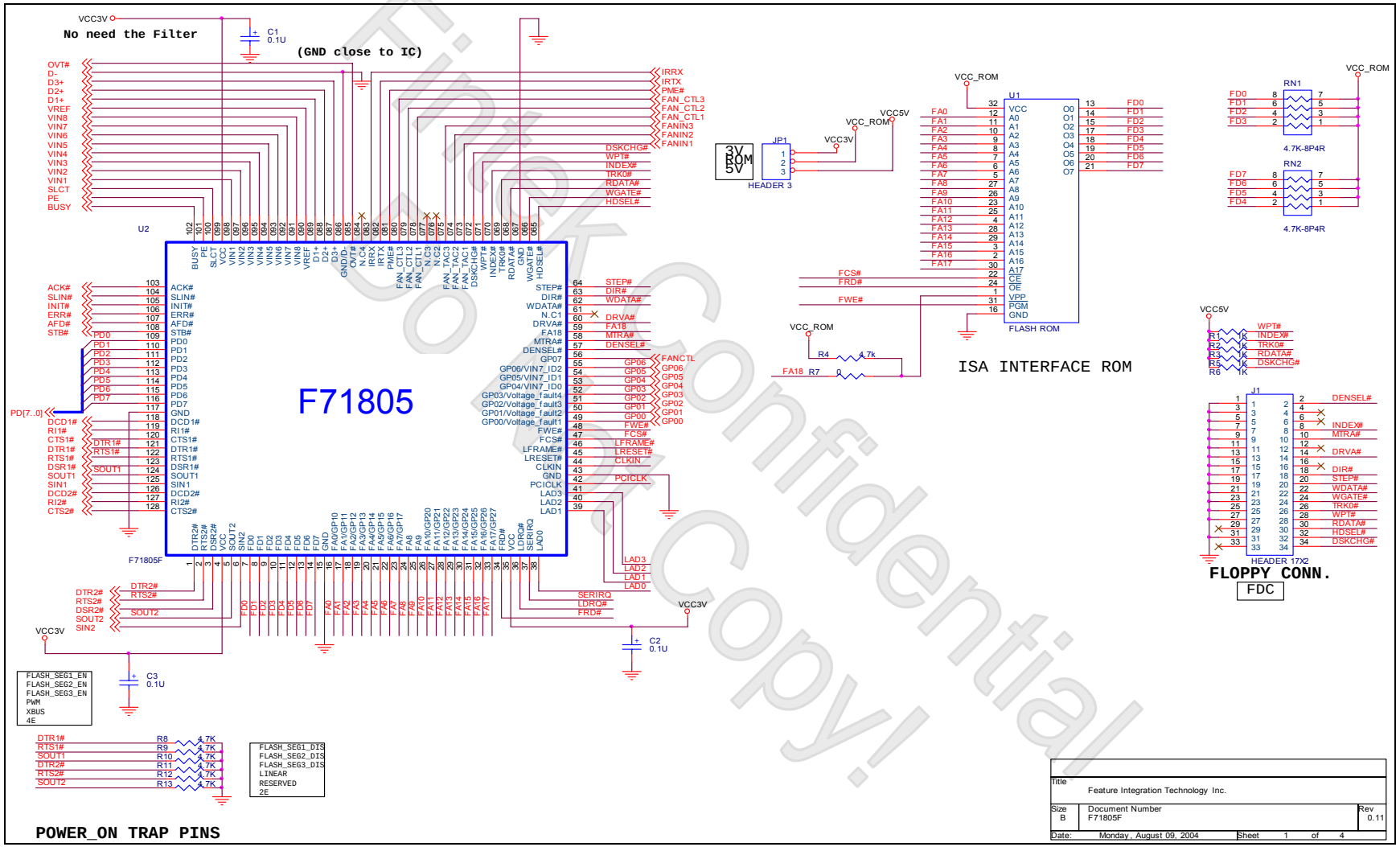
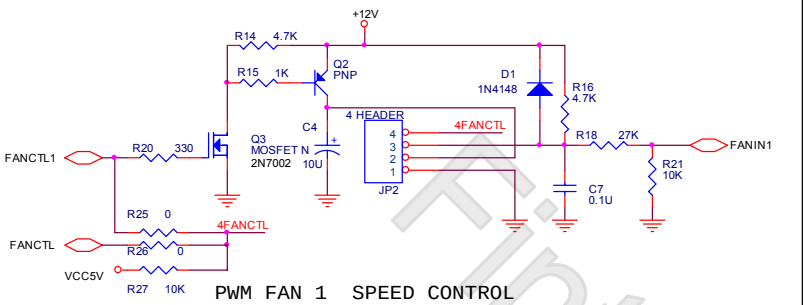
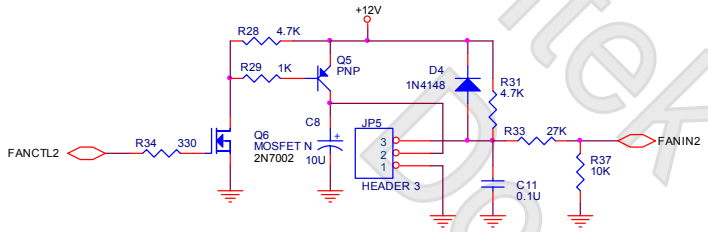
12. F71805 Demo Circuit





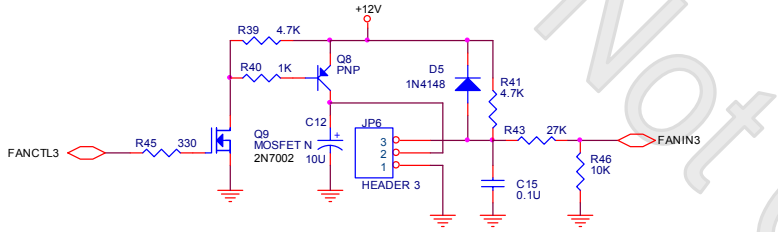
PWM FAN 1 SPEED CONTROL

The C10 is reserved for FAN noise dis-bounce.



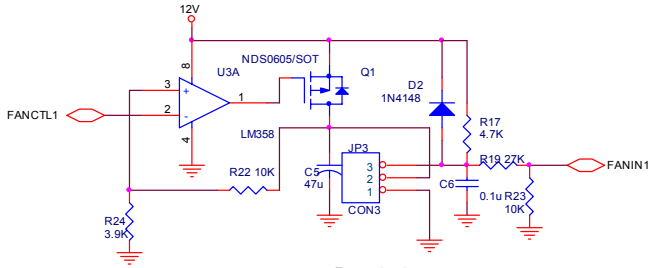
PWM FAN 2 SPEED CONTROL

The C13 is reserved for FAN noise dis-bounce.

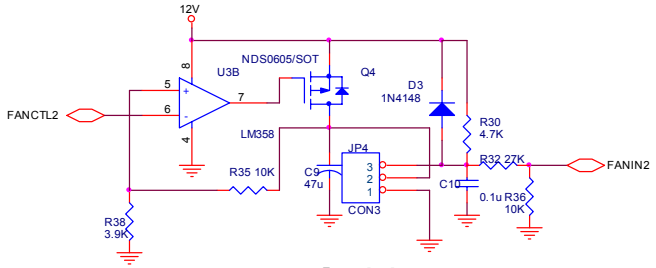


PWM FAN 3 SPEED CONTROL

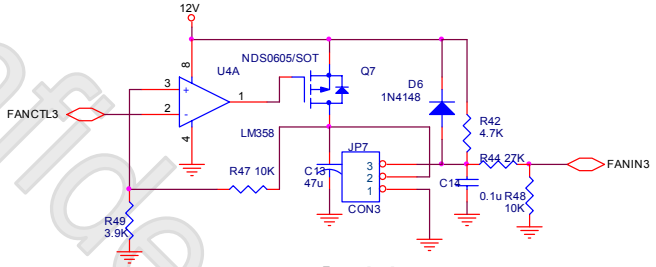
The C17 is reserved for FAN noise dis-bounce.



DC FAN Control with OP 1



DC FAN Control with OP 2



DC FAN Control with OP 3

FAN CONTROL FOR PWM OR DC

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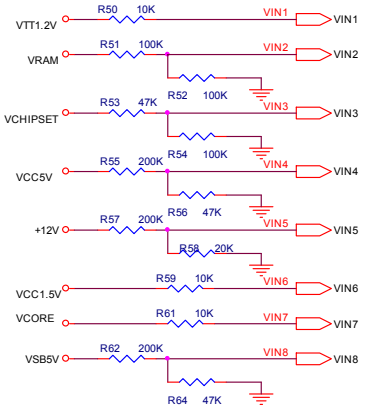
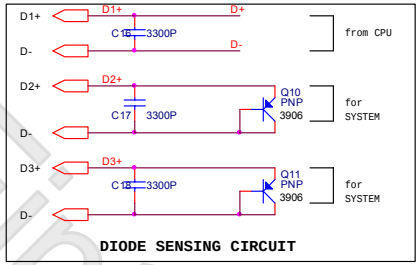
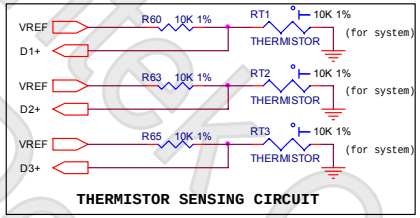


VOLTAGE SENSING.

The best voltage input level is about 1V.



DIODE SENSING CIRCUIT



THERMISTOR SENSING CIRCUIT

Temperature Sensing

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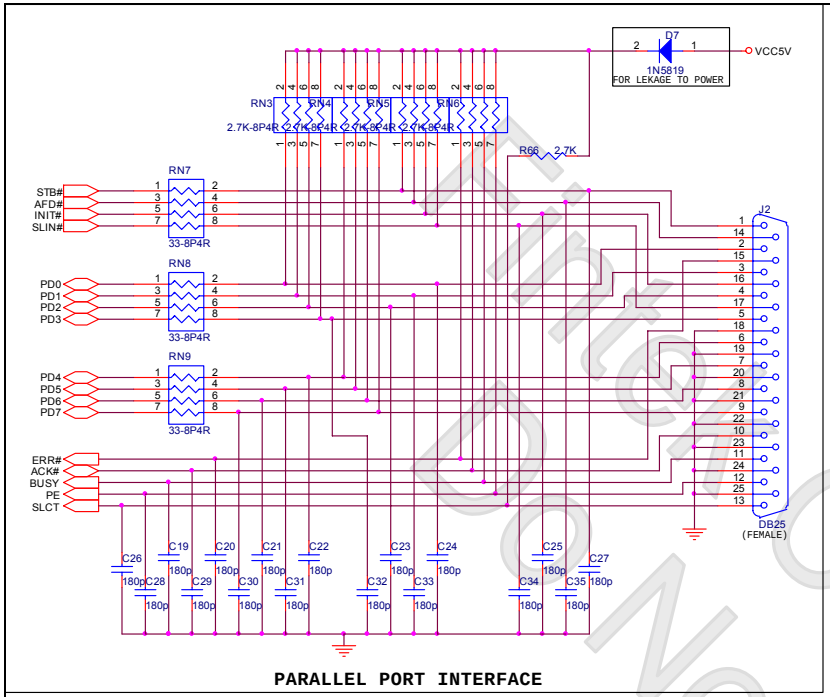
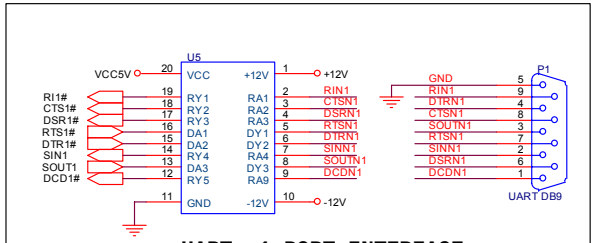
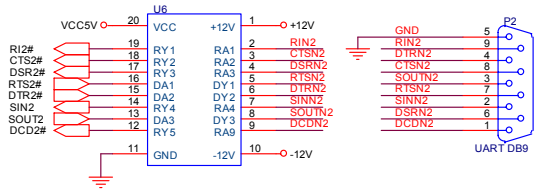


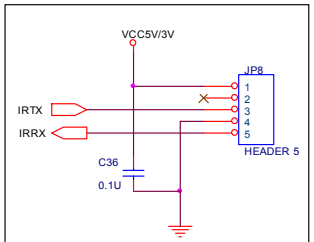
PARALLEL PORT INTERFACE



UART 1 PORT INTERFACE



UART 2 PORT INTERFACE



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