F75395

±1°C Temperature Sensor with ß Compensation

Release Date: May, 2008
Revision: V0.15P

F75395 Datasheet Revision History

Version	Date	Page	Revision History
V0.10P	2007/7/30	-	Preliminary Version
V0.11P	2007/8/7	-	Add function description
V0.12P	2007/9/20	-	Add register description
V0.13P	2008/1/8	-	F75395 won't provide SOP package in the future.
		-	Add ordering information.
		-	Add Electrical characteristic
V0.14P	2008/1/29	-	Modify typo.
V0.15P	2008/5/29	5	Modify typo. of Chapter 6.4 for Temperature Range Table

LIFE SUPPORT APPLICATIONS

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Table of Contents

1. General Description 1
2. Features 1
3. Key Specifications 2
4. Pin Configuration 2
5. Pin Descriptions 2
6. Functional Description 3
6.1 General Description 3
6.2 The warning message 3
6.3 Access Interface 4
6.4 Temperature Monitoring 5
6.5 Alert# 6
6.6 THERM# 6
6.7 ADC Conversion Sequence 6
6.8 Thermal Mass and Self Heating 7
6.9 ADC Noise Filtering 7
6.10 Beta Compensation 7
6.11 Resistor Cancelled Function 8
6.12 PCB Layout Guide 8
7. Register Description 9
7.1 Configuration Register — Index 03h(Read), 09h(Write) 9
7.2 Status Register — Index 02h 10
7.3 Conversion Rate Register — Index 04h(Read), 0Ah(Write) 10
7.4 One-Shot Register — Index 0Fh 10
7.5 Alert Queue & Timeout Register — Index 22h 11
7.6 Status-with-ARA Control Register — Index 24h 11
7.7 Beta Compensation Register—Index 3Bh 11
7.8 SST Address Register—Index 3Dh 11
7.9 Chip ID (MSB) Register—Index 5Ah 12
7.10 Chip ID (LSB) Register — Index 5Bh 12
7.11 Fintek Vendor ID (MSB) (Manufacturer ID) Register — Index 5Dh 12
7.12 Fintek Vendor ID (LSB) (Manufacturer ID) Register — Index 5Eh 12
7.13 Fintek Vendor ID II (Manufacturer ID) Register—Index FEh 12
7.14 Value RAM — Index 10h- 2Fh 12
7.15 SST Command Table 13
8. Electrical characteristic 14

8.1 Absolute Maximum Ratings 14
8.2 DC Characteristics 14
8.3 AC Characteristics 16
9. Ordering Information 16
10. Package Dimensions 17
11. Application Circuit 18

1. General Description

The F75395 is a temperature sensor IC with ß compensation and alert signal which is specific designed for notebook, graphic cards etc. An 11-bit analog-to-digital converter (ADC) was built inside F75395. The F75395 can monitor two set of temperature which is very important for the system to work stably and properly. This chip provides 1 remote temperature sensor and 1 local temperature sensor. The remote temperature sensor can be performed by CPU thermal diode or transistor 2N3906. The F75395 also can support new generational 45nm CPU temperature sensing by varied ß of CPU. The users can set up the upper and lower limits (alarm thresholds) of all monitored parameters and this chip can also issue warning messages for system protection when there is something wrong with monitored items.

Through the BIOS or application software, the users can read all the monitored parameters of system all the time. And a pop-up warning can be also activated when the monitored item was out of the proper/pre-setting range. The application software could be Fintek's application utility, or other management application software. The F75395 is in the green package of 8-pin MSOP and powered by 3.3V.

2. Features

- Provide 1 on-chip local and 1 remote temperature sensing
- ±1 °C accuarcy on remote channel and ±3 °C accuarcy on local channel
  - ◇ ±1 °C (+60 °C to +100 °C, remote) ◇ ±3 °C (+60 °C to +100 °C, local)
- Support new generational CPU temperature sensing with ß compensation
- Resistor cancelled function
- ALERT# output for SMBus alert
- Programmable alert queue
- Programmable limited and setting points(alert threshold) for all monitored items
- Provide SST and 2-wire SMBus interfaces for temperature reading by host
- 3VCC operation
- 8-MSOP Package – F75395M
- The SST slave address: 0X4Ch
- The F75395 provides SMBus address ID option by resistor selection and they have the following SMBus slave address: (Default address is 98h)

Resistor	A6	A5	A4	A3	A2	A1	A0
1k	1	0	0	1	1	1	1
4.7k	1	0	0	1	1	0	1

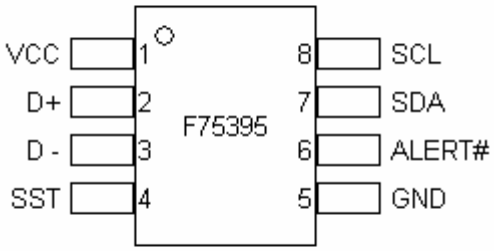
Noted: Patented TW 235231 TWI263778

10k	1	0	0	1	1	1	0
20k	0	1	1	0	1	1	0
30k	0	1	1	0	1	0	1
47k	0	1	1	0	1	0	0

3. Key Specifications

- Supply Voltage 3.0~3.6V
- Supply Current 180 uA (typ)

4. Pin Configuration



5. Pin Descriptions

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

I/O_{12ts} - TTL level and schmitt trigger

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

O_{24V4} - Output pin with 24 mA source-sink capability, output 4V

AOUT - Output pin(Analog)

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

IN_t - TTL level input pin

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

I_{Lv}/O_{D8-S1} -Low level bi-directional pin(VIH → 0.9V, VIL → 0.6V.). Output with 8mA drive and 1mA sink capability.

AIN - Input pin(Analog)

PIN NO	PIN NAME	TYPE	PWR	DESCRIPTION
1	VCC	PWR	3VCC	Power Pin
2	D+	AIN	3VCC	Positive connection to remote temperature sensor (ex: thermal diode anode)
3	D-	AIN	3VCC	Negative connection to remote temperature sensor(ex: thermal diode cathode)
4	SST	I_{Lv}/O_{D8-S1}	3VCC	Intel SST hardware monitor interface.
5	GND	PWR	3VCC	Ground
6	ALERT#	OD_{12}	3VCC	Active **LOW** output. Used as SMBus alert or Interrupt
7	SDA	IN_{ts}/OD_{12}	3VCC	Serial bus data
8	SCL	IN_{ts}	3VCC	Serial bus clock

6. Functional Description

6.1 General Description

The F75395 is a simple temperature sensor with warning signal output. It includes a local and a remote temperature sensor. Both measured temperature are compared with its high, low and THERM limits which are stored in the registers. When one or more out-of-limit events occur, the flags in Status Register will be set and that may cause ALERT output to low. Also, measured temperature exceeding THERM limit may cause THERM output to low.

6.2 The warning message

Pin4 and pin6 act as warning message when the temperature exceeds it threshold point.

6.3 Access Interface

The F75395 can be connected to a compatible 2-wire serial system management bus as a slave device under the control of the master device, using two device terminals SCL and SDA. The F75395 supports SMBus protocol of, “Write Byte”, “Read Byte”, both with or without Packet Error checking (PEC) which is calculated using CRC-8. For detail information about PEC, please check SMBus 1.1 specification. F75395 supports 25ms timeout for no activity on the SMBus. This timeout function is programmed at 22h bit7 and default is disabled. F75395 also supports Alert Response Address (ARA) protocol.

The operation of the protocol is described with details in the following sections.

(a) SMBus write to internal address register followed by the data byte

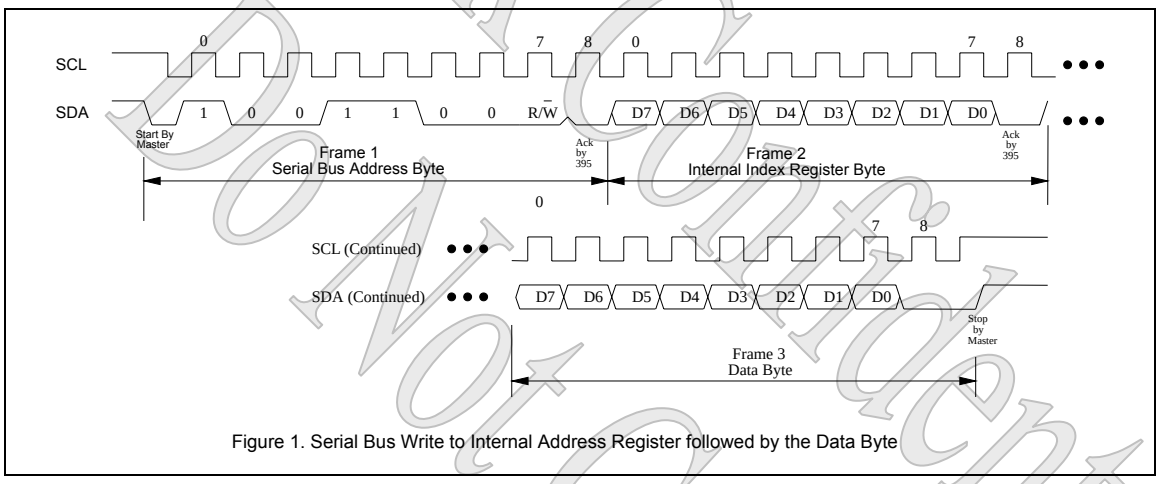


Figure 1. Serial Bus Write to Internal Address Register followed by the Data Byte

(b) Serial bus write to internal address register only

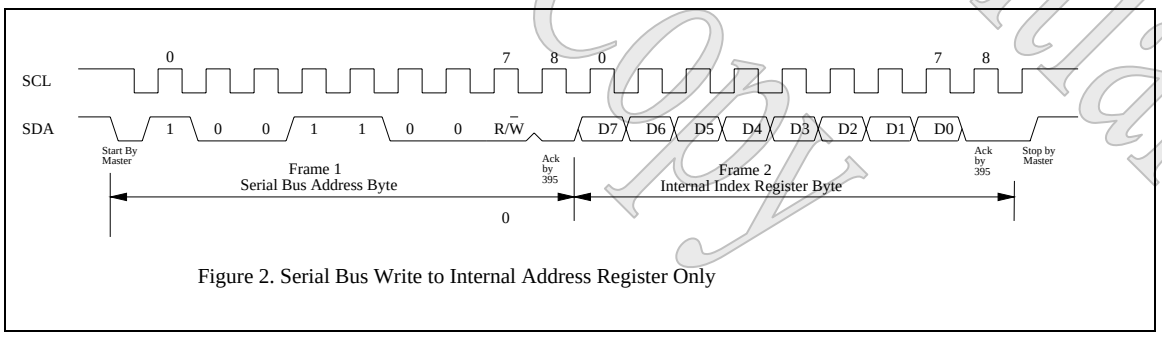


Figure 2. Serial Bus Write to Internal Address Register Only

(c) Serial bus read from a register with the internal address register prefer to desired location

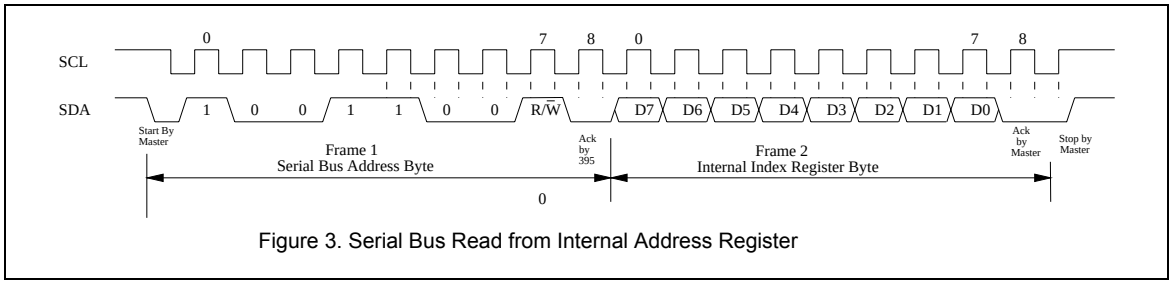


Figure 3. Serial Bus Read from Internal Address Register

(d) Alert Response Address

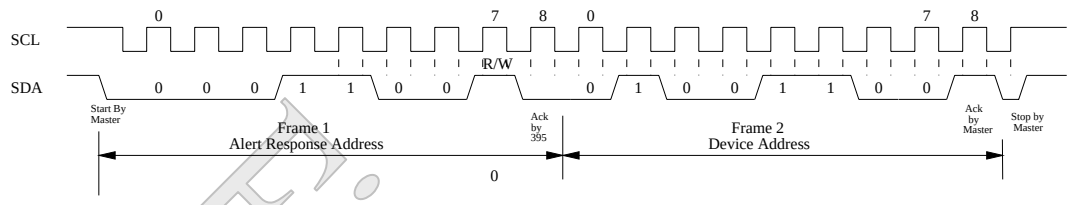


Figure 4. Alert Response Address

The F75395 provides SMBus address option function. Pull high register (Alert Pin) to select SMBus address by power on strapping and entry key writing. These two conditions must be done both for address selection. If you only option pull high register without entry key writing, the address will keep default value 98h. **For example, use 30k resistor for address 6A selection. User need to write entry key to register CRFAh.**

Ex: Original chip default address is 98h

Bus Access Byte Write (98, FA, 19)

Bus Access Byte Write (98, FA, 34)

Bus Access Byte Write (98, FA, 01)

After Entry Key writing, Chip address will change to 6Ah.

The F75395 also support SST interface for PC system of Intel platform. The system can read temperature and related information by SST interface. The F75395 can be read by Intel chipset SST interface. (Direct connect chipset pin SST to the pin SST of F75395). . About more detail, please refer Intel SST Spec. document (Protocol is edited by Intel).

6.4 Temperature Monitoring

The F75395 monitors a local and a remote temperature sensor. Both can be measured from -40°C to 127.875°C.

The temperature format is as the following table:

Temperature (High Byte)	Digital Output	Temperature (Low Byte)	Digital Output
-40°C	1101 1000	-0.875°C	001 0 0000
-20°C	1110 1100	-0.325°C	110 0 0000
-1°C	1111 1111	-0.125°C	111 0 0000
0°C	0000 0000	0°C	000 0 0000
50°C	0011 0010	0.375°C	011 0 0000
75°C	0100 1011	0.500°C	100 0 0000
100°C	0110 0100	0.750°C	110 0 0000
127°C	0111 1111	0.875°C	111 0 0000

Remote-sensor transistor manufacturers

Manufacturer	Model Number
Panasonic	2SB0709 2N3906
Philips	PMBT3906

6.5 Alert#

Five events can trigger ALERT# to low:

(1). VT1(Local) temperature exceeds High Limit

(2). VT1(Local) temperature goes below Low Limit

(3). VT2(Remote) temperature exceeds High Limit

(4). VT2(Remote) temperature goes below Low Limit

(5). VT2(Remote) temperature is Open-circuit.

These five events are wired-NOR together. This means that when one of out-of-limit event occurs, the ALERT# output goes low if the MASK control is disabled. ALERT# signal can be used as an IRQ-like interrupt or as an SMBALERT. When ALERT# acts as an IRQ-like interrupt, the ALERT# will be de-asserted until the following 2 conditions are matched:

(1). The abnormal condition is gone

(2). Reading the Status register to clear the status

When ALERT# acts as a SMBALERT, the ALERT# will be de-asserted until the following 3 conditions are matched:

(1). The abnormal condition is gone

(2). Reading the Status register to clear the status

(3). The ALERT# has been serviced by the SMBus master reading the device address.

For more information about SMBALERT, please see SMBus 1.1 specification.

6.6 THERM#

Either VT1(Local) or VT2(Remote) temperature exceeds the corresponding THERM limit, the THERM# output will assert low. The asserted output will be de-asserted until the temperature goes below (THERM Limit – Hysteresis). The hysteresis default value is 10°C and it can be programmed. Both VT1 and VT2 have their own THERM limits and Hysteresis values.

6.7 ADC Conversion Sequence

If a START command is written, both channels are converted and the results of both measurements are available after the end of conversion. A BUSY status bit in the status byte shows that the device is actually performing a new conversion; however, even if the ADC is busy, the results of the previous conversion are always available.

6.8 Thermal Mass and Self Heating

Thermal mass effect can seriously degrade the F75395's effective accuracy. The thermal time constant of the MSOP package is about 140 in still air. For the F75395 junction temperature to settle to within +1°C after a sudden +100°C change requires about five time constants or 12 minutes. The use of smaller packages for remote sensors such as SOT23, improves the situation. Take care to account for thermal gradients between the heat source and the sensor package do not interfere with measurement accuracy.
Sel-heating does not significantly affect measurement accuracy. Remote sensor self-heating due to the diode current source is negligible. For the local diode, the worst case error occurs when auto-converting at the fastest rate and simultaneously sinking maximum current at the ALERT# output. For instance, at an 64Hz rate and ALERT# sink around 0.7mA when pull up resistor 4.7K ohm to 3.3VCC, the typical power dissipation is VCC x 220 uA plus 0.4V x 0.7mA. Package θ_{JA} is about 120 °C/W, so with VCC = 3.3V and no copper PC board heat-sinking, the resulting temperature rise is:

dT = 1.01mW x 120 °C/W = 0.12 °C

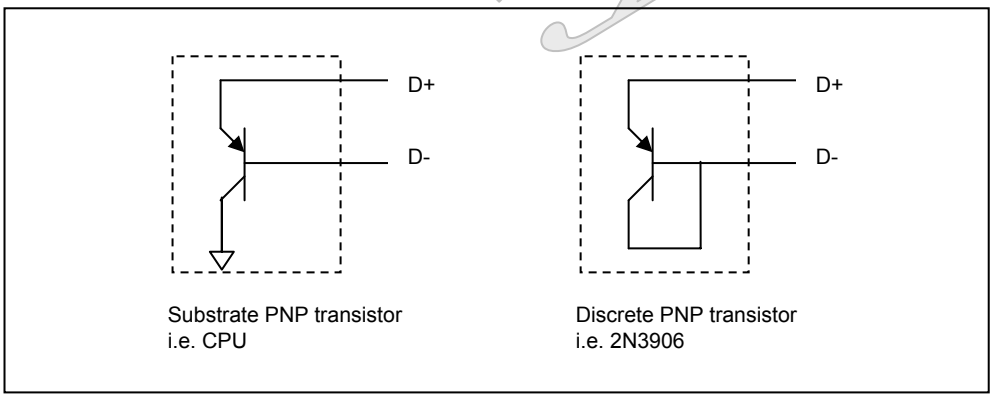
Even with these contrived circumstances, it is difficult to introduce significant self-heating errors.

6.9 ADC Noise Filtering

The ADC is integrating type with inherently good noise rejection. Micro-power operation places constraints on high-frequency noise rejection; therefore, careful PCB board layout and suitable external filtering are required for high-accuracy remote measurement in electronically noisy environment. High frequency EMI is best filtered at D+ and D- with an external 2200pF capacitor. Too high capacitance may introduce errors due to the rise time of the switched current source. Nearly all noise sources tested cause the ADC measurement to be higher than the actual temperature, depending on the frequency and amplitude.

6.10 Beta Compensation

The F75395 is configured to detect the temperature of diodes (e.g. 2N3906) or CPU thermal diodes. The diode can be connected in different way as below Figure.



The basic of the temperature sensor follows mathematical formula as below:

$$\Delta V_{BE} = \frac{KT}{q} \times \ln \frac{Ie_1}{Ie_2} = \frac{KT}{q} \times \ln \frac{\left(\frac{1+\beta_1}{\beta_1}\right) Ic_1}{\left(\frac{1+\beta_2}{\beta_2}\right) Ic_2}$$

The F75395 measures temperature from the thermal diodes by the basic. In traditional case, the F75395 outputs dual currents to a thermal diode. Then the F75395 calculates the absolute temperature by $\triangle V_{BE}$. For discrete transistor (i.e. 2N3906), the beta is normally very high such that the percent change in beta is very small. For example, 15% variation in beta for two forced I_E currents and the beta is 50 would contribute about 0.32°C error per 100°C. For Substrate PNP transistor (i.e. CPU), the beta is very small such that the proportional beta variation will very high, and it will cause large error in temperature measurement. For example, 15% variation in beta for two forced I_E currents and the beta is 0.5 would contribute about 11.12°C error per 100°C.

In Order to solve the second issue, the F75395 provides a beta compensation solution for accurate temperature sensing. There is a register (CR30h bit7) for external thermal diode selection by Beta variation. If this bit is enabled, the beta compensation will automate to measure the temperature from substrate transistor (i.e. CPU). The F75395 can support the beta range from 0.05~1.8 for beta compensation. In this new method, the F75395 will provide two I_E currents, and feedback two I_B currents. The F75395 will auto-adjust I_E (I_{E1} and I_{E2}) current and feedback I_B (I_{B1} and I_{B2}) promptly for getting proper I_C proportion (I_{C1}/ I_{C2}), then calculates the accurate temperature. This algorithm of beta compensation is suitable for substrate transistor or new generational CPU (i.e. 45nm CPU) because small beta and high proportional beta variation. The default value of register CR3Bh bit7 is enabled for measure substrate transistor. If user would like to detect discrete transistor and the beta is big enough, please disable this bit for detecting. About this section application, please refer the register description for detail.

6.11 Resistor Cancelled Function

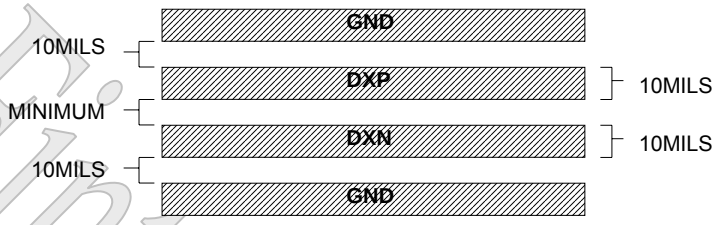
The F75393/F75394 can cancel resistor effect from CPU internal circuit or PCB circuit.

6.12 PCB Layout Guide

PCB can be electrically noisy environments, and the F75395 is measuring very small voltage from the remote sensor, so care must be taken to minimize noise which is occurred at the sensor inputs. The following guideline should be taken to reduce the measurement error of the temperature sensors:

1. Place the F75395 as close as practical to the remote sensing 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.
2. Route the D+ and D- tracks close together, in parallel, 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.



3. Use wide tracks to minimize inductance and reduce noise pickup. 10 mil track minimum width and spacing is recommended.
4. Try to minimize the number of copper/solder joints, which can cause thermocouple effects. Where copper/solder joints 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.
5. Place a 0.1μF bypass capacitor close to the VCC pin. In very noisy environments, place an external 2200pF input filter capacitors across D+, D- close to the F75395.
6. 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.
7. 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 may be reduced or removed. Cable resistance can also induce errors. 1 Ω series resistance introduces about 0.5℃ error.

7. Register Description

7.1 Configuration Register — Index 03h(Read), 09h(Write)

Bit	Name	R/W	Default	Description
7	ALERT_MASK	R/W	0	Set to 1, mask ALERT# signal output.
6	RUN_STOP	R/W	0	Set to 0, monitor. Set to 1, stop monitor (power down mode).
5-1	Reserved	RO	0	Reserved, always return 0.
0	PWR_DON	R/W	0	Power down this device.

7.2 Status Register — Index 02h

Bit	Name	R/W	Default	Description
7	ADC_BUSY	RO	0	Set to 1, ADC is converting.
6	VT1HIGH	RO	0	Set to 1, VT1 temperature exceeds high limit. Set to 0, VT1 temperature does not exceed high limit.
5	VT1LOW	RO	0	Set to 1, VT1 temperature goes below low limit. Set to 0, VT1 temperature does not goes below low limit.
4	VT2HIGH	RO	0	Set to 1, VT2 temperature exceeds high limit. Set to 0, VT2 temperature does not exceed high limit.
3	VT2LOW	RO	0	Set to 1, VT2 temperature goes below low limit. Set to 0, VT2 temperature does not goes below low limit.
2	OPEN	RO	0	Set to 1, VT2 is open-circuit.
1	VT2THERM	RO	0	Set to 1, VT2 temperature exceeds its THERM limit.
0	VT1THERM	RO	0	Set to 1, VT1 temperature exceeds its THERM limit.

VT1 (Local); VT2 (Remote)

7.3 Conversion Rate Register — Index 04h(Read), 0Ah(Write)

Bit	Name	R/W	Default	Description			
7-0	CONV_RATE	R/W	08h	Set conversion times per second.			
				Value	Conversion/Sec	Value	Conversion/Sec
				00h	0.0625	06h	4
				01h	0.125	07h	8
				02h	0.25	08h	16
				03h	0.5	09h	32
				04h	1	0Ah	64
				05h	2	0Bh ~ FFh	Reserved

7.4 One-Shot Register — Index 0Fh

Bit	Name	R/W	Default	Description
7-0	ONE-SHOT	WO	xxh	When chip is at standby mode, writing any value to this register will initiate a single conversion and comparison cycle. After the single cycle, chip will returns to standby mode.

7.5 Alert Queue & Timeout Register — Index 22h

Bit	Name	R/W	Default	Description
7	EN_I2CTMOUT	R/W	0	Set to 1, enable serial interface timeout function. (Timeout time = 25ms) Set to 0, disable.
6-4	Reserved	RO	0	
3-1	ALERT_QUEUE	R/W	0	This number determines how many abnormal measurements must occur before ALERT signal is generated. 000 : Once 001 : Twice 011 : 3 times 111 : 4 times
0	Reserved	RO	1	Always read 1.

7.6 Status-with-ARA Control Register — Index 24h

Bit	Name	R/W	Default	Description
7-1	Reserved	RO	0	Reserved
0	EN_ARA_STS	R/W	1	Set to 1, ALERT de-asserted condition is related with ARA. Set to 0, ALERT de-asserted condition is not related with ARA(Alert Response Address).

7.7 Beta Compensation Register—Index 3Bh

Bit	Name	R/W	Default	Description
7	BETA_EN	R/W	1	1: Enable beta compensation function. 0: Disable beta compensation function.
6	BIAS_SEL	R/W	0	0: DN pad BIAS voltage 150mV 1: DN pad BIAS voltage 220mV
5-4	Reserved	R/W	0h	Dummy registers.
3	R_CANCELLED	R/W	1	1: Enable resister cancelled function. 0: Disable register cancelled function.
2-0	Reserved	R/W	2h	Dummy registers.

7.8 SST Address Register—Index 3Dh

Bit	Name	R/W	Default	Description

7	Reserved	RO	0h	Always return 0
6-0	SST_ADDR	R/W	4ch	User can program this byte to change SST address

7.9 Chip ID (MSB) Register—Index 5Ah

Bit	Name	R/W	Default	Description
7-0	F_CHIP_ID	RO	07h	Fintek Chip ID 1

7.10 Chip ID (LSB) Register — Index 5Bh

Bit	Name	R/W	Default	Description
7-0	F_CHIP_ID	RO	07h	Fintek Chip ID 2

7.11 Fintek Vendor ID (MSB) (Manufacturer ID) Register — Index 5Dh

Bit	Name	R/W	Default	Description
7-0	F_VENDOR_ID	RO	19h	Fintek Vendor ID 1

7.12 Fintek Vendor ID (LSB) (Manufacturer ID) Register — Index 5Eh

Bit	Name	R/W	Default	Description
7-0	F_VENDOR_ID	RO	34h	Fintek Vendor ID 2

7.13 Fintek Vendor ID II (Manufacturer ID) Register—Index FEh

Bit	Name	R/W	Default	Description
7-0	VENDOR_ID	R/W	23h	Vendor ID

7.14 Value RAM — Index 10h- 2Fh

VT1 : Local Temperature

VT2 : Remote Temperature

The value in quota is its power-on default value.

Description	Attribute	Read Address (High Byte)	Read Address (Low Byte)	Write Address (High Byte)	Write Address (Low Byte)
VT1 reading	RO	00h	1Ah		

VT2 reading	RO	01h	10h		
VT1 High Limit	R/W	05h (55h)	1Bh (00h)	0Bh	1Bh
VT1 Low Limit	R/W	06h (00h)	1Ch (00h)	0Ch	1Ch
VT2 High Limit	R/W	07h (55h)	13h (00h)	0Dh	13h
VT2 Low Limit	R/W	08h (00h)	14h (00h)	0Eh	14h
VT1 THERM limit	R/W	20h (55h)		20h	
VT1 THERM Hysteresis	R/W	21h (0Ah)		21h	
VT2 THERM limit	R/W	19h (55h)		19h	
VT2 THERM Hysteresis	R/W	23h (0Ah)		23h	
VT1 Offset	R/W	1Dh (00h)	1Eh (00h)	1Dh	1Eh
VT2 Offset	R/W	11h (00h)	12h (00h)	11h	12h

7.15 SST Command Table

Command	WL/RL/CC	Description
GetExtTemp()	0x01/0x02/0x01	Use 0x4C SST address (default CR3D) and command 0x01 to get F75395 external temperature.
GetIntTemp()	0x01/0x02/0x02	Use 0x4C SST address (default CR3D) and command 0x02 to get F75395 internal temperature.
GetAllTemp()	0x01/0x04/0x01	Returns a 4-byte block of data.
GetDIB()	0x01/0x08/0xf7 0x01/0x10/0xf7	8 bytes of DIB information. 16 bytes of DIB information.

8. Electrical characteristic

8.1 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

8.2 DC Characteristics

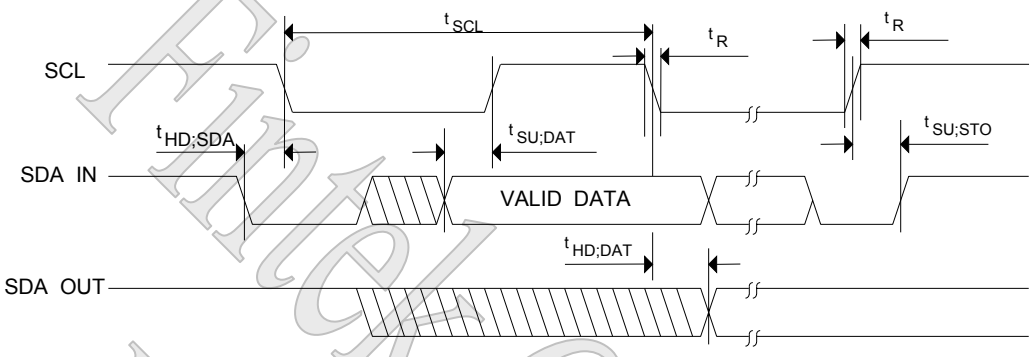
(T_A = 0° C to 70° C, VDD = 3.3V ± 10%, VSS = 0V)

Parameter	Conditions	MIN	TYP	MAX	Unit
Temperature Error, Remote Diode	60 °C < T_D < 100 °C, VCC = 3.0V to 3.6V		± 1		°C
	-40 °C <T_D < 60°C, 100 °C <T_D < 127°C		± 1	± 3	
Temperature Error, Local Diode	0 °C < T_A < 100 °C, VCC = 3.0V to 3.6V		± 1	± 3	°C
Supply Voltage range		3.0	3.3	3.6	V
Average operating supply current	16 Conversions / Sec Rate		280		uA
	0.0625 Conversions / Sec Rate		180		uA
Standby supply current			5		uA
Resolution			0.125		°C
Under-voltage lockout threshold	VDD input, Disables ADC , Rising Edge		2.55		V
Power on reset threshold			2.2	2.4	V
Diode source current	High Level		95		uA
	Low Level		10		uA

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

PARAMETER	SYM.	MIN.	TYP.	MAX.	UNIT	CONDITIONS
I/O_{12t} - TTL level bi-directional pin with source-sink capability of 12 mA						
Input Low Voltage	VIL			0.8	V	
Input High Voltage	VIH	2.0			V	
Output Low Current	IOL	10	12		mA	VOL = 0.4V
Output High Current	IOH		-12	-10	mA	VOH = 2.4V
Input High Leakage	ILIH			+1	μA	VIN = VDD
Input Low Leakage	ILIL			-1	μA	VIN = 0V
I/O_{12ts} - TTL level bi-directional pin with source-sink capability of 12 mA and schmitt-trigger level input						
Input Low Threshold Voltage	Vt-	0.5	0.8	1.1	V	VDD = 3.3 V
Input High Threshold Voltage	Vt+	1.6	2.0	2.4	V	VDD = 3.3 V
Output Low Current	IOL	10	12		mA	VOL = 0.4 V
Output High Current	IOH		-12	-10	mA	VOH = 2.4V
Input High Leakage	ILIH			+1	μA	VIN = VDD
Input Low Leakage	ILIL			-1	μA	VIN = 0V
OUT_{12t} - TTL level output pin with source-sink capability of 12 mA						
Output Low Current	IOL	12	16		mA	VOL = 0.4V
Output High Current	IOH		-14	-12	mA	VOH = 2.4V
OD_{16} - Open-drain output pin with sink capability of 16 mA						
Output Low Current	IOL	12	16		mA	VOL = 0.4V
IN_{ts} - TTL level Schmitt-triggered input pin						
Input Low Threshold Voltage	Vt-	0.5	0.8	1.1	V	VDD = 3.3V
Input High Threshold Voltage	Vt+	1.6	2.0	2.4	V	VDD = 3.3V
Input High Leakage	ILIH			+1	μA	VIN = VDD
Input Low Leakage	ILIL			-1	μA	VIN = 0 V

8.3 AC Characteristics



Serial Bus Timing Diagram

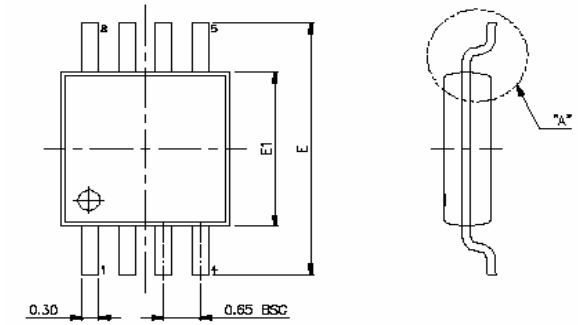
Serial Bus Timing

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
SCL clock period	t_{SCL}	2		uS
Start condition hold time	$t_{HD;SDA}$	300		nS
Stop condition setup-up time	$t_{SU;STO}$	300		nS
DATA to SCL setup time	$t_{SU;DAT}$	50		nS
DATA to SCL hold time	$t_{HD;DAT}$	5		nS
SCL and SDA rise time	t_R		300	nS

9. Ordering Information

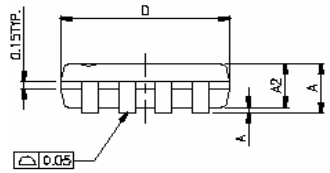
Part Number	Package Type	Production Flow
F75395M	8-MSOP Green Package	Commercial, 0°C to +70°C

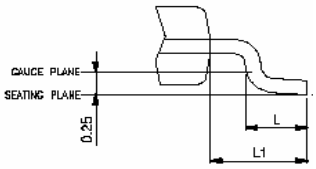
10. Package Dimensions



SYMBOLS	MIN.	NOM.	MAX.
A	–	–	1.10
A1	0.00	–	0.15
A2	0.75	0.85	0.95
D		3.00 BSC	
E		4.90 BSC	
E1		3.00 BSC	
L	0.40	0.60	0.80
L1		0.95 REF	
θ°	0	–	8

UNIT : MM





NOTES:
1. JEDEC OUTLINE : MO-187 AA
2. DIMENSION "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE.
3. DIMENSION "E1" DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 PER SIDE.
4. DIMENSION "0.22" DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 MM TOTAL IN EXCESS OF THE "0.22" DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT. MINIMUM SPAC BETWEEN PROTRUSION AND ADJACENT LEAD IS 0.07 MM.
5. DIMENSIONS "D" AND "E1" TO BE DETERMINED AT DATUM PLANE H.

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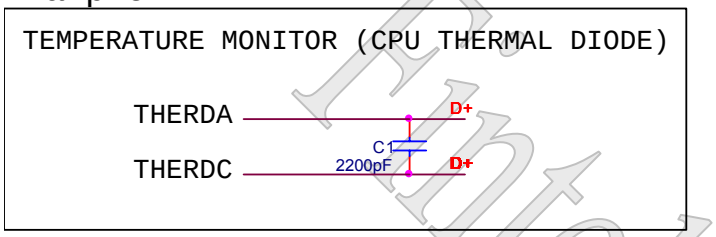
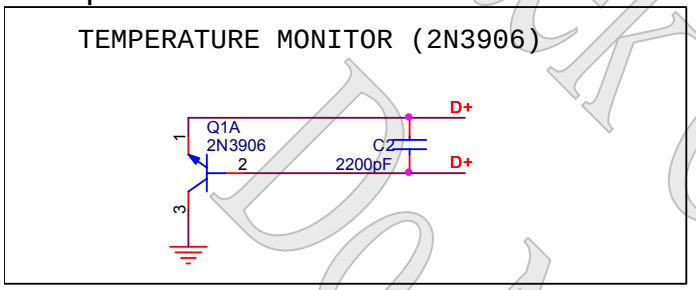
11. Application Circuit

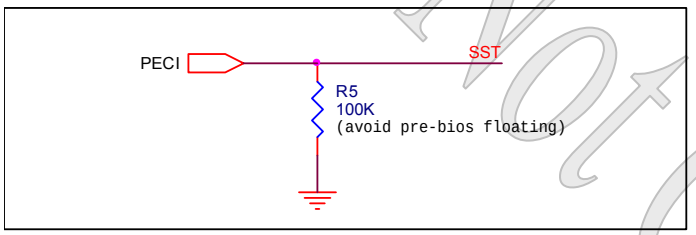
Example 1 :

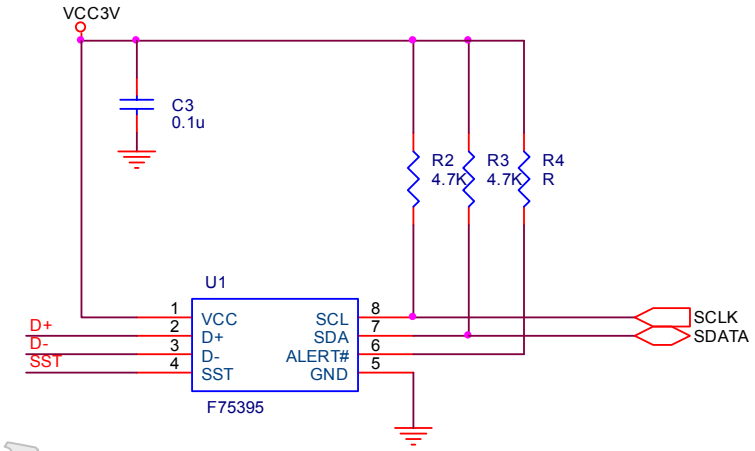


Example 2 :



SST





I2C & SST Address Trapping :

ALERT#(PIN6)Pull-up Resistor

R4 = 1K	I2C Address = 9Eh	SST Address = 4Dh
R4 = 4.7K	I2C Address = 98h	SST Address = 4C/30h
R4 = 10K	I2C Address = 9Ch	SST Address = 4Bh
R4 = 20K	I2C Address = 6Ch	SST Address = 4Ah
R4 = 30K	I2C Address = 6Ah	SST Address = 49h
R4 = 47K	I2C Address = 68h	SST Address = 48h

Title: Feature Integration Technology		
Size: Custom	Document Number: F75395 Application Circuit	Rev: <Rev Code>
Date: Thursday, May 29, 2008	Sheet 1 of 1	