F75367 Datasheet

±1°C Temperature Sensor with I2C-SST Bridge

Release Date: February, 2008
Revision: V0.11P

F75367 Datasheet Revision History

Version	Date	Page	Revision History
V0.10P	2007/12/20	-	Preliminary Version.
V0.11P	2008/2/29	-	Add register and function descriptions

Table of Contents

1. General Description

The F75367 is a temperature sensor IC with ß compensation and supports I2C to SST Master Bridge function. This chip provides 2-remote temperature sensor, 1-local temperature sensor and 6-remote temperature input by SST Master. The local temperature sensor can be applied to sense environment temperature without any component. The 2 remote temperature sensors can be performed by CPU thermal diode or transistor 2N3906. The F75367 also can support new generational 45nm CPU temperature sensing by varied ß of CPU. Besides 3 sets temperature sensors, the F75367 also can read 6 temperature inputs from other devices by SST interfaces. The host can read the extra 6 sets temperature by I2C interface (I2C to SST Master Bridge). Totally the F75367 can support 9 temperature outputs for host fan control by I2C.

The F75367 is in the green package of 8-pin SOP and powered by 3.3V.

2. Features

- Provide 1 on-chip local and 2 remote temperature sensors
  - Accuracy ±1 °C from +60°C to +100°C on remote channel
  - Accuracy ±3 °C from +60°C to +100°C on local channel
- Support 6 temperature inputs from external sensor devices (ex: F75395)
- Beta-compensation support for new generational CPU.
- SST Master interfaces for external devices' temperature sensing
- I2C to SST Master Bridge
- V_{CC}3V operation and 8 SOP Green Package
- I2C slave address:

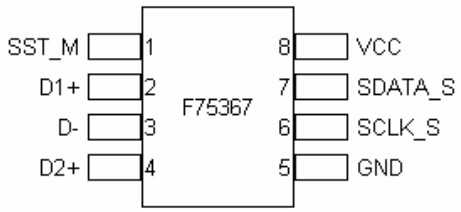
	A6	A5	A4	A3	A2	A1	A0
F75367	1	0	0	1	1	1	0

3. Key Specifications

■	Supply Voltage	3.0V to 3.6V
■	Operating Supply Current	typ.
■	Measured Range	-40 ~ 127 °C
■	Remote Diode Temperature Accuracy	±1°C from +60°C to +100°C

- Local Temperature Accuracy ±3°C from +60°C to +100°C

4. Pin Configuration



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5. Pin Description

I_{Lv}/O_{D8-S1} - Low level bi-directional pin (VIH → 0.9V, VIL → 0.6V.). Output with 8mA drive and 1mA sink capability.
OOD_{12} - can select to OD or OUT by register, with 12 mA source-sink capability.
AOUT - Output pin(Analog).
OD_{12} - Open-drain output pin with 12 mA sink capability.
OD_{12-5V} Open-drain output pin with 12 mA sink capability, 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
8	VCC	P	3.3V power supply voltage input
5	GND	P	GND

5.2. Monitoring Items and Fan Speed Control

Pin No.	Pin Name	Type	PWR	Description
1	SST_M	I_{Lv}/O_{D8-S1}		Intel SST master hardware monitor interface
2	D1+	AOUT AIN		Positive connection to remote temperature sensor

3	D-	AGND		Negative connection to remote temperature sensor
4	D2+	AOUT AIN		Positive connection to remote temperature sensor
6	SCLK_S	IN_{ts5V}		Slave serial bus clock
7	SDATA_S	IN_{ts5V}/OD_{12}		Slave serial bus data

6. Function Description

The F75367 is a temperature sensor IC with ß compensation and supports I2C to SST Master Bridge function. This chip provides 2-remote temperature sensors, 1-local temperature sensor and 6-external remote temperature input (external devices) by SST Master. The local temperature sensor can be applied to sense environment temperature without any component. The 2 remote temperature sensors can be performed by CPU thermal diode or transistor 2N3906. The F75367 supports new generational 45nm CPU temperature sensing by varied ß of CPU. Besides 3 temperature sensors, the F75367 also can read 6 temperature inputs from other devices by SST interfaces. The host can read the extra 6 sets temperature by I2C interface (I2C to SST Master Bridge). Totally the F75367 can support 9 temperature outputs for host fan control by I2C.

6.1 Access Interface

The F75367 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 F75367 supports I2C 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 I2C specification. F75367 also supports Alert Response Address (ARA) protocol.
The operation of the protocol is described with details in the following sections.

(a) I2C write to internal address register followed by the data byte

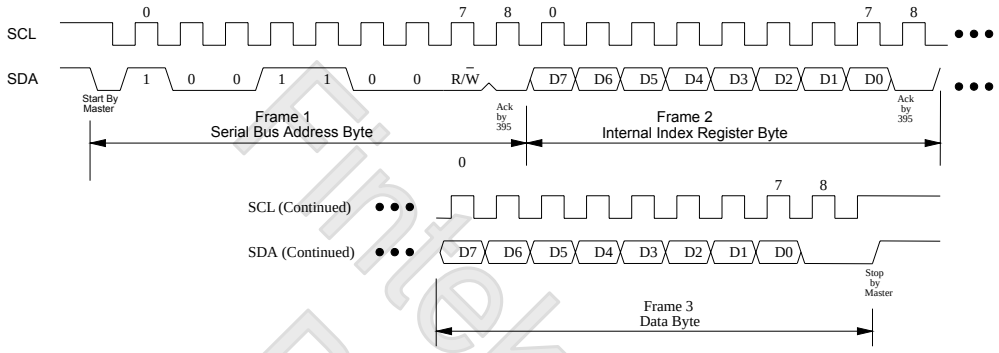


Figure 1. Serial Bus Write to Internal Address Register followed by the Data Byte

(b) Serial bus write to internal address register only

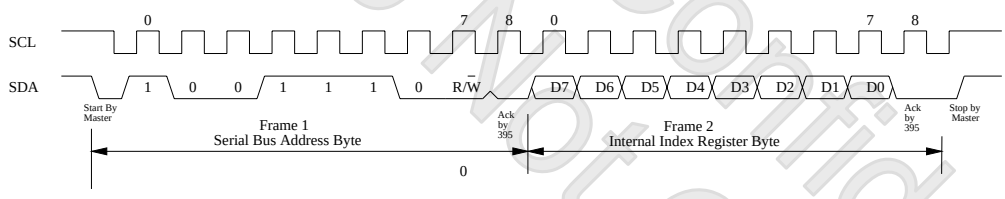


Figure 2. Serial Bus Write to Internal Address Register Only

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

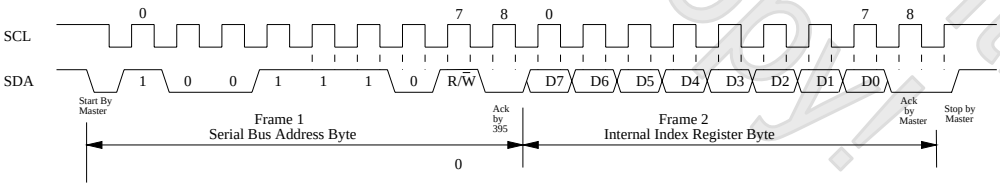


Figure 3. Serial Bus Read from Internal Address Register

6.2 Temperature Monitoring

The F75367 monitors local and 2 remote temperature sensors. Both can be measured from 0°C to 140.875°C.

The temperature format is as the following table:

Temperature (High Byte)	Digital Output	Temperature (Low Byte)	Digital Output
0°C	0000 0000	0°C	000 0 0000
1°C	0000 0001	0.125°C	001 0 0000
25°C	0001 1001	0.250°C	010 0 0000

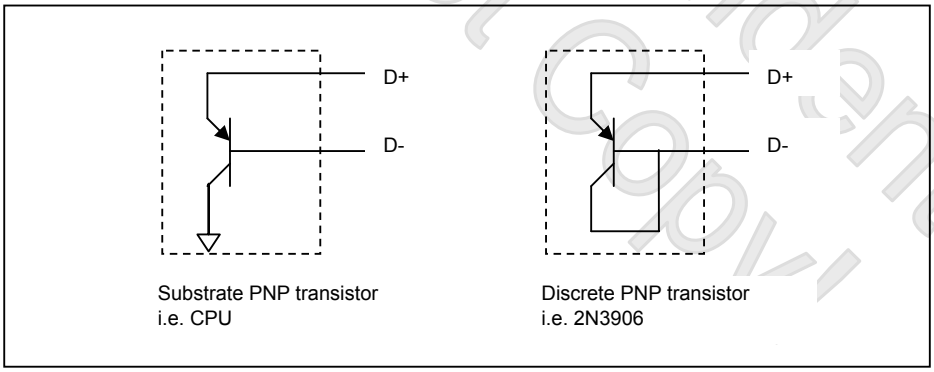
50°C	0011 0010	0.375°C	011 0 0000
75°C	0100 1011	0.500°C	100 0 0000
90°C	0101 1010	0.625°C	101 0 0000
100°C	0110 0100	0.750°C	110 0 0000
140°C	1000 1100	0.875°C	111 0 0000

Remote-sensor transistor manufacturers

Manufacturer	Model Number
Panasonic	2SB0709 2N3906
Philips	PMBT3906

6.3 Beta Compensation

The F75367 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 F75367 measures temperature from the thermal diodes by the basic. In traditional case, the F75367 outputs dual currents to a thermal diode. Then the F75367 calculates the absolute temperature by △VBE. 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 IE currents and the beta is 50 would contribute about 0.32℃ error per 100℃. 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 IE currents and the beta is 0.5 would contribute about 11.12℃ error per 100℃.

In Order to solve the second issue, the F75367 provides a beta compensation solution for accurate temperature sensing. The F75367 can support the beta range over 0.2 for beta compensation. In this new method, the F75367 will provide two IE currents, and feedback two IB currents. The F75367 will auto-adjust IE (IE1 and IE2) current and feedback IB (IB1 and IB2) promptly for getting proper IC proportion (IC1/ IC2), 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.

6.4 SST Master

F75367 Support 6 external device inputs for temperature reading by SST and pass to host by I2C. It's really a SST to I2C bridge IC for some specific SST temperature sensors' application. User can ready SST temperature sensor by F75367 bridge function. For instance, user would like to read an external SST temperature sensor by F75367. She could follow below list to read the SST Device Temperature.

If the address/index of SST device is 49h/00h.Before you read the temperature from SST device. You should do below list:

1. write register 49h to register 40h (Define external device0 address)
2. write 00h to register 48h (Define external device0 index)
3. write "1" to register 50h bit 0 (Enable external device0)
4. read register 78h to get the temperature value of SST device

Totally the F75367 can support 6 external device inputs by SST master. About the detail setting of register, please refer the register description.

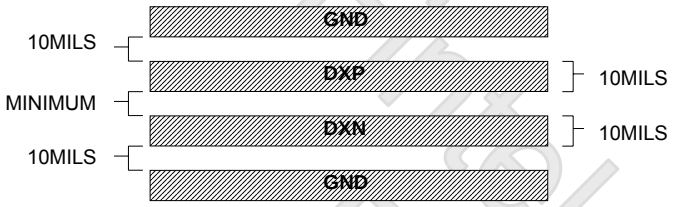
6.5 PCB Layout Guide

PCB can be electrically noisy environments, and the F75367 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:

Place the F75367 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.

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.



Use wide tracks to minimize inductance and reduce noise pickup. 10 mil track minimum width and spacing is recommended.

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.

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 F75367.

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 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 01h

Bit	Name	R/W	Default	Description
7-1	-	R/W	0	Reserved
0	T_START	R/W	1	Set one to enable startup of temperature monitoring operations; a zero puts the part in standby mode.

7.2. Configuration Register — Index 0ah

Bit	Name	R/W	Default	Description
7	-	-	0	Reserved
6	SST_3V_EN	R/W	0	Enable SST master to output 3 volt signal
5	-	R/W	1	Reserved
4-2	-	R/W	0	Reserved
1-0	-	R	0	Reserved

7.3. External Device Address Register— Index 40h ~ 45h

Bit	Name	R/W	Default	Description
7-0	DEV_ADDR	R/W	0	Device address of external device0 ~ device5 setting.

7.4. External Device Index Register— Index 48h ~ 4dh

Bit	Name	R/W	Default	Description
7-0	DEV_INDEX	R/W	0	Device index of external device0 ~ device5.

7.5. External Device Enable Register— Index 50h

Bit	Name	R/W	Default	Description
7-6	-	R/W	0	Reserved
5-0	DEV_EN	R/W	0	External device enable. (Bit mask)

7.6. External Device Monitoring Cycle Select Register 1 — Index 52h

Bit	Name	R/W	Default	Description
7-6	CYC_SEL3	R/W	2'b11	Select device monitoring cycle: 2'b11: 8hz 2'b10: 4hz 2'b01: 2hz 2'b00: 1hz
5-4	CYC_SEL2	R/W	2'b11	
3-2	CYC_SEL1	R/W	2'b11	
1-0	CYC_SEL0	R/W	2'b11	

7.7. External Device Monitoring Cycle Select Register 2 — Index 53h

Bit	Name	R/W	Default	Description
7-6	Reserved	R	0	Select device monitoring cycle: 2'b11: 8hz 2'b10: 4hz 2'b01: 2hz 2'b00: 1hz
5-4	Reserved	R/W	2'b11	
3-2	CYC_SEL5	R/W	2'b11	
1-0	CYC_SEL4	R/W	2'b11	

7.8. SST Device Reset Register — Index 55h

Bit	Name	R/W	Default	Description
7	-	R/W	0	Reserved
6	RESET_SST_EN	R/W	0	Set this bit to reset SST device, this bit will be cleared after reset

5	-	R/W	0	Reserved
4-2	RESET_DEV_SEL	R/W	0	Select which SST device to be reset
1	-	R/W	0	Reserved
0	-	R/W	0	Reserved

7.9. Temperature Interrupt Status Register — Index 61h (If DEV_BANK_EN is 0)

Bit	Name	R/W	Default	Description
7	DEV_T_EXC_STS	R	0	A one indicates at least one of TEMP3~TEMP8 temperature sensor has exceeded high limit or below the "high limit –hysteresis" limit. Write 1 to clear this bit, write 0 will be ignored.
6-3	-	R	0	Reserved
2	T2_EXC _STS	R/W	0	A one indicates TEMP2 temperature sensor has exceeded high limit or below the "high limit –hysteresis" limit. Write 1 to clear this bit, write 0 will be ignored.
1	T1_EXC _STS	R/W	0	A one indicates TEMP1 temperature sensor has exceeded high limit or below the "high limit –hysteresis" limit. Write 1 to clear this bit, write 0 will be ignored.
0	LOCAL_EXC _STS	R/W	0	A one indicates temperature sensor (local temperature) has exceeded the high limit or below the "high limit –hysteresis" limit. Write 1 to clear this bit, write 0 will be ignored.

7.10. Temperature Interrupt Status Register — Index 61h (If DEV_BANK_EN is 1)

Bit	Name	R/W	Default	Description
7-6	-	R	0	Reserved
5	T8_EXC _STS	R/W	0	A one indicates TEMP8 temperature sensor has exceeded high limit or below the "high limit –hysteresis" limit. Write 1 to clear this bit, write 0 will be ignored.
4	T7_EXC _STS	R/W	0	A one indicates TEMP7 temperature sensor has exceeded high limit or below the "high limit –hysteresis" limit. Write 1 to clear this bit, write 0 will be ignored.
3	T6_EXC _STS	R/W	0	A one indicates TEMP6 temperature sensor has exceeded high limit or below the "high limit –hysteresis" limit. Write 1 to clear this bit, write 0 will be ignored.
2	T5_EXC _STS	R/W	0	A one indicates TEMP5 temperature sensor has exceeded high limit or below the "high limit –hysteresis" limit. Write 1 to clear this bit, write 0 will be ignored.

1	T4_EXC _STS	R/W	0	A one indicates TEMP4 temperature sensor has exceeded high limit or below the “high limit –hysteresis” limit. Write 1 to clear this bit, write 0 will be ignored.
0	T3_EXC _STS	R/W	0	A one indicates TEMP3 temperature sensor has exceeded high limit or below the “high limit –hysteresis” limit. Write 1 to clear this bit, write 0 will be ignored.

7.11. Temperature Real Time Status Register — Index 62h (If DEV_BANK_EN is 0)

Bit	Name	R/W	Default	Description
7	DEV_T_EXC	R	0	Set when one of TEMP3~TEMP8 exceeds the high limit. Clear when the TEMP3~TEMP8 is below the “high limit –hysteresis” temperature.
6-3	-	R	0	Reserved
2	T2_EXC	R	0	Set when the TEMP2 exceeds the high limit. Clear when the TEMP2 is below the “high limit –hysteresis” temperature.
1	T1_EXC	R	0	Set when the TEMP1 exceeds the high limit. Clear when the TEMP1 is below the “high limit –hysteresis” temperature.
0	LOCAL_EXC	R	0	Set when the local temperature exceeds the high limit. Clear when the local temperature is below the “high limit –hysteresis” temperature.

7.12. Temperature Real Time Status Register — Index 62h (If DEV_BANK_EN is 1)

Bit	Name	R/W	Default	Description
7-6	-	R	0	Reserved
5	T8_EXC	R	0	Set when the TEMP8 exceeds the high limit. Clear when the TEMP8 is below the “high limit –hysteresis” temperature.
4	T7_EXC	R	0	Set when the TEMP7 exceeds the high limit. Clear when the TEMP7 is below the “high limit –hysteresis” temperature.
3	T6_EXC	R	0	Set when the TEMP6 exceeds the high limit. Clear when the TEMP6 is below the “high limit –hysteresis” temperature.
2	T5_EXC	R	0	Set when the TEMP5 exceeds the high limit. Clear when the TEMP5 is below the “high limit –hysteresis” temperature.
1	T4_EXC	R	0	Set when the TEMP4 exceeds the high limit. Clear when the TEMP4 is below the “high limit –hysteresis” temperature.
0	T3_EXC	R	0	Set when the TEMP3 exceeds the high limit. Clear when the TEMP3 is below the “high limit –hysteresis” temperature.

7.13. Temperature Real Time Status Register — Index 65h

Bit	Name	R/W	Default	Description
7-1	-	R	0	Reserved
0	DEV_BANK_EN	R/W	0	Set 1 to choose external device bank

7.14. Temperature Offset bank select Register — Index 67h

Bit	Name	R/W	Default	Description
7-2	Reserved	RO	0	--
1-0	OFFSET_SEL	R/W	0	This register is for device F75367 use, not for external device used. 0: CR68 is local temperature offset. 1: CR68 is temperature 1 offset. 2: CR68 is temperature 2 offset.

7.15. Temperature Offset Register — Index 68h

Bit	Name	R/W	Default	Description
7	-	RO	0	Reserved
6-0	T_OFFSET	R/W	0	Temperature offset register. The real temperature value will be added by this offset and then will be put into temperature reading (Index 70h~75h). The offset ranges from -64ºC to +63ºC. 7'b011_1111: mean temperature + 63; 7'b000_0001: mean temperature + 1; 7'b000_0000: mean temperature + 0; 7'b111_1111: mean temperature - 1; 7'b100_0000: mean temperature - 64;

7.16. DIODE OPEN Status Register — Index 6Fh (If DEV_BANK_EN is 0)

Bit	Name	R/W	Default	Description
7-4	-	R	0	Reserved
4	DEV_OPEN	R	0	One of the diode of external device0-5 (T3~T8) is open or short
3	-	R	0	Reserved
2	T2_DIODE_OPEN	R	0h	External diode 2 is open or short
1	T1_DIODE_OPEN	R	0h	External diode 1 is open or short
0	T0_DIODE_OPEN	R	0h	Internal diode 0 is open or short

7.17. DIODE OPEN Status Register — Index 6Fh (If DEV_BANK_EN is 1)

Bit	Name	R/W	Default	Description

7-6	-	R	0	Reserved
5	T8_DIODE_OPEN	R	0	The diode of T8 (External Device5) is open or short
4	T7_DIODE_OPEN	R	0	The diode of T7 (External Device4) is open or short
3	T6_DIODE_OPEN	R	0	The diode of T6 (External Device3) is open or short
2	T5_DIODE_OPEN	R	0	The diode of T5 (External Device2) is open or short
1	T4_DIODE_OPEN	R	0	The diode of T4 (External Device1) is open or short
0	T3_DIODE_OPEN	R	0	The diode of T3 (External Device0) is open or short

7.18. Temperature Register — Index 70h ~ 83h

Address	Attribute	Default Value	Description
70h	RO	--	Local temperature[10:3] reading. The unit of reading is 1°C.At the moment of reading this register. (when open or short this byte will return 0)
71h	RO	--	CR71 bit7-bit5 are the Local temperature reading value[2:0]. The unit of reading is 0.125°C. CR71 bit 0 is the sign bit of the Local temperature. (when open or short this byte will return 1, “sign bit set to 1”)
72h	RO	--	Temperature 1 reading. The unit of reading is 1°C.At the moment of reading this register.
73h	RO	--	CR73 bit7-bit5 are the temperature 1 reading value[2:0]. The unit of reading is 0.125°C. CR73 bit 0 is the sign bit of the temperature 1. (when open or short this byte will return 1, “sign bit set to 1”)
74h	RO	--	Temperature 2 reading. The unit of reading is 1°C.At the moment of reading this register.
75h	RO	--	CR75 bit7-bit5 are the temperature 2 reading value[2:0]. The unit of reading is 0.125°C. CR75 bit 0 is the sign bit of the temperature 2. (when open or short this byte will return 1, “sign bit set to 1”)
78h	RO	--	T3_read (External Device 0) The unit of reading is 1°C.At the moment of reading this register.
79h	RO	--	T4_read (External Device 1) The unit of reading is 1°C.At the moment of reading this register.
7Ah	RO	--	T5_read (External Device 2) The unit of reading is 1°C.At the moment of reading this register.
7Bh	RO	--	T6_read (External Device 3) The unit of reading is 1°C.At the moment of reading this register.
7C	RO	--	T7_read (External Device 4) The unit of reading is 1°C.At the moment of reading this register.
7D	RO	--	T8_read (External Device 5) The unit of reading is 1°C.At the moment of reading this register.

81h	R/W	3Ch	Local Temperature sensor high limit. The unit is 1°C. (If DEV_BANK_EN is 0)
81h	R/W	55h	T3 high limit. The unit is 1°C. (If DEV_BANK_EN is 1)
83h	R/W	55h	Temperature sensor 1 high limit. The unit is 1°C. (If DEV_BANK_EN is 0)
83h	R/W	55h	T4 high limit. The unit is 1°C. (If DEV_BANK_EN is 1)
85h	R/W	55h	Temperature sensor 2 high limit. The unit is 1°C. (When DEV_BANK_EN is 0)
85h	R/W	55h	T5 high limit. The unit is 1°C. (If DEV_BANK_EN is 1)
87h	R/W	55h	T6 high limit. The unit is 1°C. (If DEV_BANK_EN is 1)
89h	R/W	55h	T7 high limit. The unit is 1°C. (If DEV_BANK_EN is 1)
8Bh	R/W	55h	T8 high limit. The unit is 1°C. (If DEV_BANK_EN is 1)

7.19. Temperature Filter Select Register — Index 8Eh

Bit	Name	R/W	Default	Description
7-6	-	R	0	Reserved
5-4	IIR-QUEUR2	R/W	1h	The queue time for second filter to quickly update values. 00: 8 times. 01: 16 times. (default). 10: 24 times. 11: 32 times.
3-2	IIR-QUEUR1	R/W	1h	The queue time for second filter to quickly update values. 00: 8 times. 01: 16 times. (default). 10: 24 times. 11: 32 times.
1-0	IIR-QUEUR-LOCAL	R/W	1h	The queue time for second filter to quickly update values. 00: 8 times. 01: 16 times. (default). 10: 24 times. 11: 32 times.

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 VCC+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

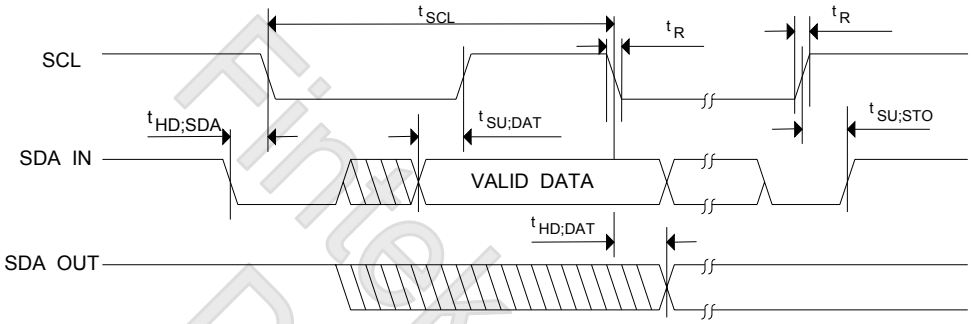
(T_A = 0° C to 70° C, VCC = 3.3V ± 10%, VSS = 0V)

Parameter	Conditions	MIN	TYP	MAX	Unit
Temperature Error, Remote Diode	60 °C < T_D < 100 °C, VCC = 3.0V to 3.6V -40 °C <T_D < 60°C, 100 °C <T_D < 127°C		± 1 ± 1	 ± 3	°C
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			800		uA
Standby supply current			480		uA
Resolution			0.125		°C
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, VCC = 3.3V ± 10%, VSS = 0V)

PARAMETER	SYM.	MIN.	TYP.	MAX.	UNIT	CONDITIONS
IN_{ts5v} /OD_{12} - TTL level bi-directional pin with sink capability of 12 mA and schmitt-trigger level input with 5V tolerance						
Input Low Voltage	VIL			0.8	V	VCC = 3.3 V
Input High Voltage	VIH	2.0			V	VCC = 3.3 V
Output Low Current	IOL	10	12		mA	VOL = 0.4V
Input High Leakage	ILIH			+1	µA	VIN = VCC
Input Low Leakage	ILIL			-1	µA	VIN = 0V
IN_{ts5v} /O_{12} - TTL level bi-directional pin with source-sink capability of 12 mA and schmitt-trigger level input with 5V tolerance						
Input Low Threshold Voltage	Vt-	0.5	0.8	1.1	V	VCC = 3.3 V
Input High Threshold Voltage	Vt+	1.6	2.0	2.4	V	VCC = 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 = VCC
Input Low Leakage	ILIL			-1	µA	VIN = 0V
IN_{ts5v} - TTL level Schmitt-triggered input pin with 5V tolerance						
Input Low Threshold Voltage	Vt-	0.5	0.8	1.1	V	VCC = 3.3V
Input High Threshold Voltage	Vt+	1.6	2.0	2.4	V	VCC = 3.3V
Input High Leakage	ILIH			+1	µA	VIN = VCC
Input Low Leakage	ILIL			-1	µA	VIN = 0 V
I_{lv} /O_{D8-S1} – Low voltage level bidirection pin with 8 mA source capability (Internal pull-down sink 1 mA)						
Input Low Threshold Voltage	V_{lvt-}		0.4		V	VCC = 3.3V
Input High Threshold Voltage	V_{lvt+}		1.0		V	VCC = 3.3V
Input High Leakage	$ILIH_{lv}$			+1	µA	VIN = VCC
I_{lv} /O_{D8} – Low voltage level bidirection pin with 8 mA source capability						
Input Low Threshold Voltage	V_{lvt-}		0.4		V	VCC = 3.3V
Input High Threshold Voltage	V_{lvt+}		1.0		V	VCC = 3.3V
Input High Leakage	$ILIH_{lv}$			+1	µA	VIN = VCC
Input Low Leakage	$ILIL_{lv}$			-1	µA	VIN = 0 V

8.3 AC Characteristics



Serial Bus Timing Diagram

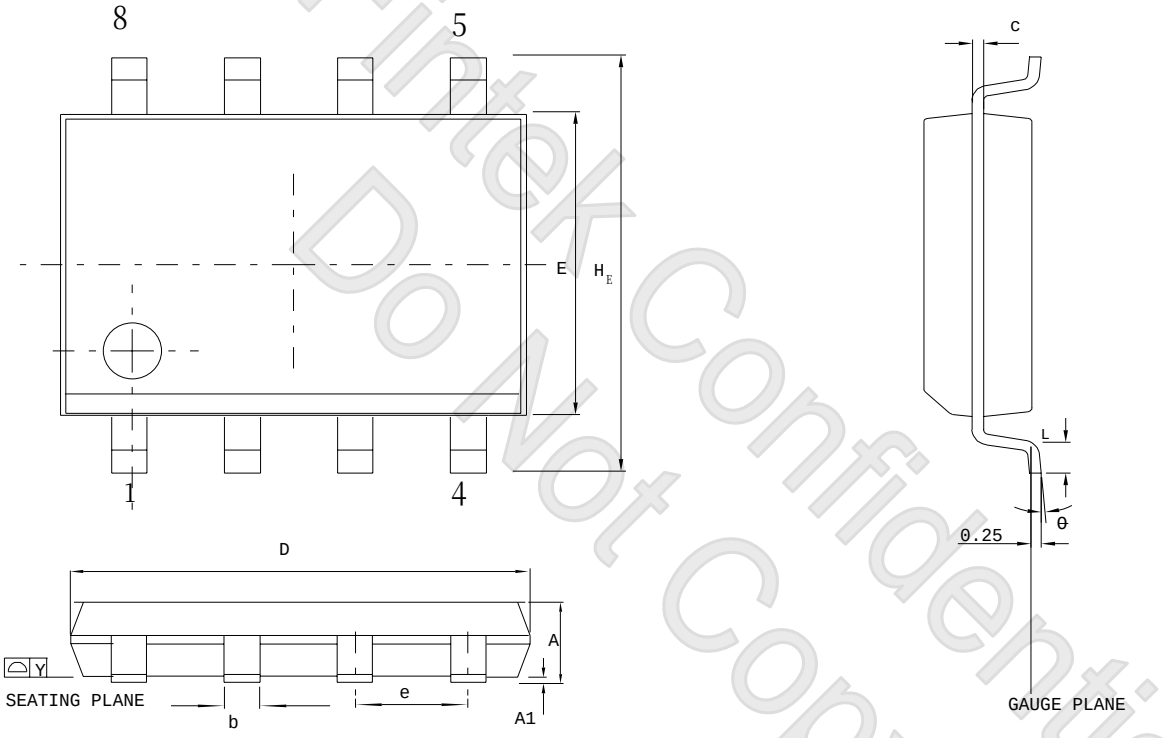
Serial Bus Timing

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
F75367S	8 pin SOP Green Package	Commercial, 0°C to +70°C

10. Package Dimensions



Control demensions are in milmeters .

SYMBOL	DIMENSION IN MM		DIMENSION IN INCH	
	MIN.	MAX.	MIN.	MAX.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
b	0.33	0.51	0.013	0.020
c	0.19	0.25	0.008	0.010
E	3.80	4.00	0.150	0.157
D	4.80	5.00	0.188	0.196
e	1.27 BSC		0.050 BSC	
H_E	5.80	6.20	0.228	0.244
Y	—	0.10	—	0.004
L	0.40	1.27	0.016	0.050
θ	0	10	0	10

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