INNOVATIVE SENSOR TECHNOLOGY

TSic™ 206

Rapid Response, Low-Cost Temperature Sensor IC with Digital Output

Data Sheet

TSic™ 206 Features

- Low cost, precision temperature sensor
- Single-wire 11-bit digital serial signal output
- Communication range > 10 meters
- Resolution: 0.1°C
- Accuracy: ±0.5°C over span of 80°C
- Wide measurement range: –50 to +150 ºC
- Signal read-out every 0.1s (other rates available on request)
- Supply Voltage 3.0V to 5.5V
- Package: 8-pin SOIC, 3-pin e-line, Chip on Flex, Die on Wafer
- Low quiescent current to minimize self-heating and power consumption (45µA typ.)
- System-on-chip based on advanced mixed-signal CMOS technology integrating precision temperature sensing bandgap reference with proportional-to-absolute-temperature (PTAT) output, digital signal processor (DSP) core, and electrically erasable memory (EEPROM)

TSic™ Family

The TSic™ temperature sensor IC family are fully tested and calibrated sensors with absolute measurement accuracy on delivery – no further calibration needed. The TSic™ combines outstanding accuracy with long term stability, yet it is very simple to use.

The TSic™ series is specifically designed for high performance, cost-effective solutions for sensing temperature in building automation, automotive, industrial, office automation, white goods and low-power/mobile applications.

TSic™ employs a high precision bandgap reference with PTAT output; a low-power, precision ADC; and an on-chip DSP core with EEPROM to precisely calibrate the output temperature signal. The TSic™ series includes ICs with two linear analog signal output options, such as standard 0~1Vout (Supply voltage (V+) = 3.0V to 5.5V) or ratiometric (10~90% of supply voltage); or the digital serial output signal for interfacing with microcontrollers.

Benefits

- **Several accuracy classes available with 100% upward compatibility**
- **No calibration by customer needed; absolute calibration specified**
- **Simple to integrate, reducing cost and time for application-development**
- **Fast data measurement – optimal for temperature control**
- **Packages for standard SMD, THT or application specific assembly**
- **Miniaturized solutions with Bare-Chip (COB, COF, CSP*) or e-line packages – very fast response time for COF**
- **Very low power consumption – ideal for mobile and standard applications**
- **Field reconfiguration/recalibration option available (high volume customers only)**
- **Outstanding long term stability**

** COB: Chip-On-Board; COF: Chip-On-Flex; CSP: Chip Scale Packaging*

Application Support

For TSic™ evaluation ZMD provides a special Evaluation Tool. *(Ordering Code: TSic Lab Kit)*

Further application support is available through the hotline: *email: tsic@zmd.de*

Phone: +49 351 8822-916

Absolute Maximum Ratings

PARAMETER	MIN	MAX	UNITS
Supply Voltage (V+)	-0.3	6.0	V
Voltages at analog I/O – Pins (V_{INA}, V_{OUTA})	-0.3	V_{DDA}+0.3	V
Storage Temperature Range (T_{stor})	-50	150	°C

Operating Conditions

PARAMETER	MIN	TYP	MAX	UNITS
Supply[1] Voltage to Gnd (V+)	3.0	5.0	5.5	V
Supply Current (I_{V+}) [2] @ V+ = 3.3V, RT	30	45	80	µA
Ambient Temperature[3] Range (T_{amb})	-50		150	°C
External Capacitance between V+ and Gnd[4] (C_{V+})	80	100	470	nF
Output Load Capacitance (C_L)			15	nF
Output Load Resistance between signal and Gnd (or V+)	1			MΩ

[1] *With supply voltage 2.7V – 3.0V accuracy reduced.*

[2] *Without load*

[3] *Output signal is limited to this ambient temperature ±3°C (with regard to calibration, offset and gain)*

[4] *Recommended as close to TSic V+ and Gnd-Pins as possible*

Temperature Accuracy[5]

PARAMETER	MIN	TYP	MAX	UNITS
Wide Range Device for -50° to 150°C				
T1 +10°C to +90°C	-0.5	±0.3	0.5	°C
T2 -20°C to +110°C	-0.5	+0.4	0.95	°C
T3 -50°C to +150°C	-0.5	+0.9	2.0	°C

[5] Accuracy = specification plus quantization error of 1 bit (0.1°C), 2σ value.
Other TSic products with customer specific calibration available on request: i.e. with special calibration where the 80°C span (bandgap) with the high precision temperature range of ±0.5 °C is shifted to another (lower or higher) temperature range.
Temperature range limits T1, T2: ±0.1°C; T3: ±3°C

Output Examples for TSic™ Devices

		Temperature Measurement Range -50°C to 150°C or -58°F to 302°F (Wide Range Device)
		TSic-206
Temp (°C)	**Temp (°F)**	**Digital**
-50	-58	0x000
-10	14	0x199
0	32	0x200
25	77	0x2FF
60	140	0x465
125	257	0x6FE
150	302	0x7FF

Temperature = (Digital Signal / 2047 ∗ 200 - 50)°C

Lifetime for TSic™ Devices

TSic™ device lifetime is dependent upon its operating temperature.

Operating Temperature	expected Lifetime
140°C...150°C	min. 1500h
125°C...140°C	min. 3000h

Package Information

TSic™ 206 SOP8: 150mil, Standard SMT Package, SOIC, Based on IEC 191-2Q, Type 076E35 B. Other packages available on demand: TSic™ 206 e-line; 3 pin THT package; Chip on Flex; TSic™ 206 wafer level.

For further information see also Technical Note:

"TSic™ Die and Package Specifications for TSic™ Temperature Sensor IC"

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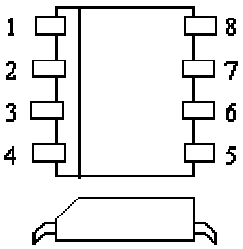
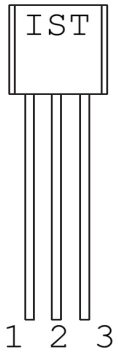
SOP8 Package



Pin	Name	Description
1	V+	Supply voltage (3.0-5.5V)
2	Signal	Temperature output signal
4	GND	Ground
3, 5-8	TP/NC	Test pin / NC Do not connect

E-Line Package



Pin	Name	Description
1	GND	Ground
2	Signal	Temperature output signal
4	V+	Supply Voltage (3.0-5.5V)

Related products and ordering information

For related products and ordering information see www.zmd.biz and ZMD "*TSic™ Ordering Guide*".

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For the current revision of this document and for additional product information please look at www.zmd.biz.

Notes :

