Description

The TMP709 is a fully integrated, resistor-programmable temperature switch with a temperature threshold that is set by just one external resistor within the entire operating range. The TMP709 provides an open-drain, active-low output and has a 2.7V to 5.5V supply-voltage range. °C

The temperature threshold accuracy is typically ±0.5°C, with a maximum of ±3°C (60°C to 100°C). The quiescent current consumption is typically 33 μ A. Hysteresis is pin-selectable to 2°C or 10°C.

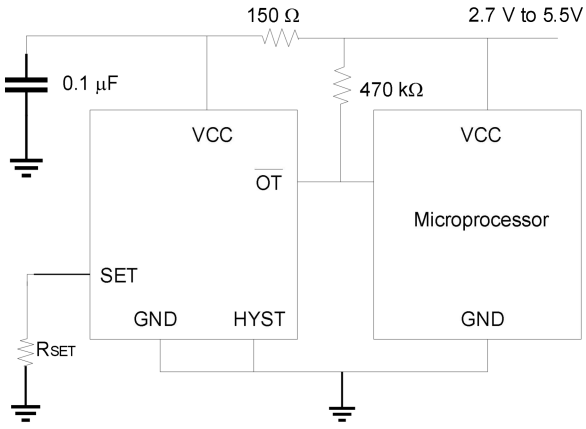
The TMP709 is available in a 5-pin SOT-23 and small DFN 6 package.

Features

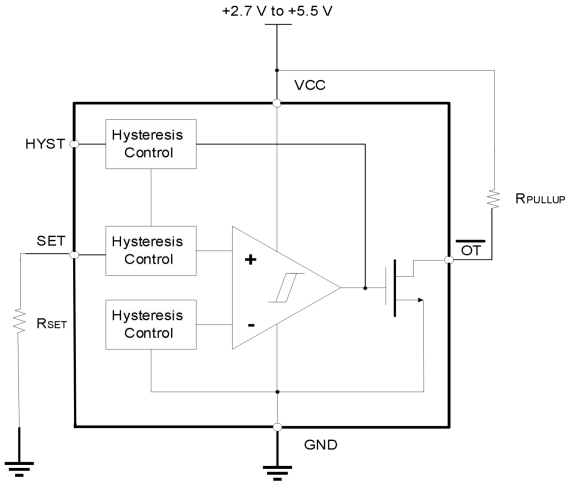
- Threshold accuracy:
  - ± 0.5℃ Typical
  - ± 3℃ Maximum (+ 60℃ to 100℃)
- Temperature threshold set by **1%** external resistor
- Low quiescent current: 33μA typical
- Open-drain, active-low output stage
- Pin-selectable 2℃ or 10℃ hysteresis
- Reset operation specified at VCC =0.8V
- Power range: 2.7V to 5.5V
- Packaging: 5-pin SOT23, 6-pin DFN package

Applications

- Computers (laptops and desktops)
- servers
- Industrial and medical equipment
- Storage Area Networks
- Automobiles



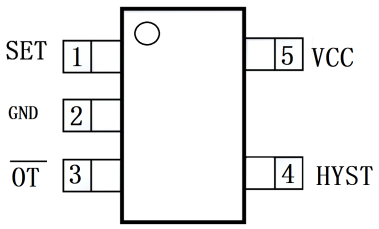
Typical Application



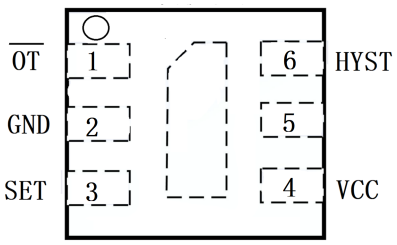
Chip Internal Structure Diagram

Pin Configuration and Functions

SOT 23-5
TOP VIEW



DFN6
TOP VIEW



Pin Functions

PIN			DESCRIPTION
SOT 23-5	DFN6	NAME	
1	3	SET	Temperature set point. Connect an external 1% resistor between SET and GND.
2	2	GND	Device ground.
3	1	$\overline{OT}$	Open-drain, active-low output.
4	6	HYST	Hysteresis selection. For 10°C, HYST = VCC; for 2°C, HYST = GND.
5	4	VCC	Supply voltage pin. The voltage range is 2.7V to 5.5V.
	5	NC	No connection.

Absolute Maximum Ratings

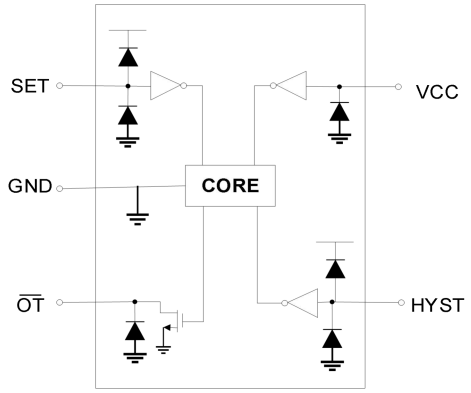
	MIN	MAX	UNIT
Supply Voltage VCC	-0.3	6	V
$\overline{OT}$ Pin Voltage	-0.3	6	V
HYST and SET Pin Voltage	-0.3	(Vcc+0.3)	V
Operating Temperature	-40	125	℃
Junction Temperature		150	℃
Storage Temperature	-65	150	℃

Unless otherwise noted, the specifications in the above table apply within the atmospheric temperature range.

Stresses beyond the range may cause permanent damage to the device.

Electrostatic Protection

		Value	UNIT
Electrostatic Discharge Voltage V_{ESD}	Human-body Model (HBM)	5 000	V
	Charged-device Model (CDM)	2000	V
	Latch up Test	100	mA
	Machine Model (MM)	200	V



TMP709 Internal ESD Equivalent Circuit

Recommended Operating Conditions

	MIN	NOM	MAX	UNIT
Supply Voltage VCC	**2.7**	**3.3**	**5.5**	**V**
Operating Temperature T_A	**0**		**125**	℃

Unless otherwise stated, the specifications in the above table apply within the atmospheric temperature range.

Electrical Characteristics

Unless otherwise specified, electrical characteristics of devices at T_A = 0℃ to +125℃ and V_{CC} = 2.7V ~ 5.5V.

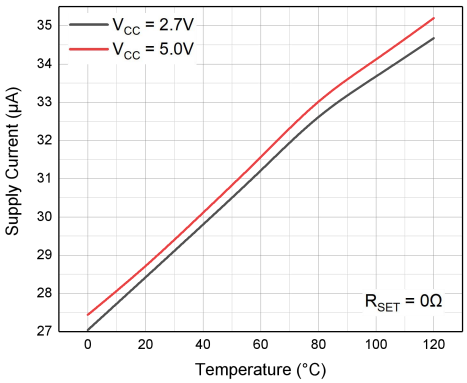
PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Supply					
V_{CC} Supply voltage range		2.7		5.5	V
I_{CC} Supply current	V_{CC} =5V		3 3	55	μA
	V_{CC} =2.7V		3 3	55	μA
Temperature					
T_E Temperature error	T_A=+6 0℃ to + 100℃		±0.5	±3	℃
Digital input (HYST)					
V_{IH} High level input voltage		0.7 ×V_{CC}			V
V_{IL} Low level input voltage				0.3 ×V_{CC}	V
C_{IN} Input capacitance			10		pF
Analog input (SET)					
V_{IN} Input voltage range		0		V CC	V
Ilkg_in Input leakage current			1		μA
Digital open-drain output (OT)					
$I_{(OT\_SINK)}$ Output sink current	V_{OT} =0.3 V	5	12		mA
$I_{lkg(OT)}$ Output leakage current	V_{OT} = V_{CC}		1		μA

Thermal Information

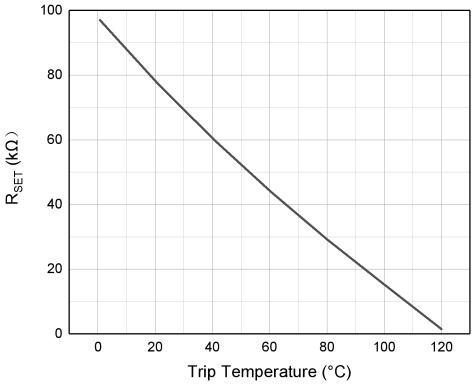
THERMAL METRIC		TMP709 DBV(SOT23) 5 PINS	UNIT
θJA	Junction to ambient thermal resistance	217.9	℃/W
θJCtop	Junction to chip case (top) thermal resistance	86.3	
θJB	Junction to board thermal resistance	44.6	
ψ JT	Junction to top characterization parameters	4.4	
ψJB	Junction to circuit board characterization parameters	43.8	
θJCbo	Junction to chip case (bottom) thermal resistance	unavailable	

Typical Characteristics

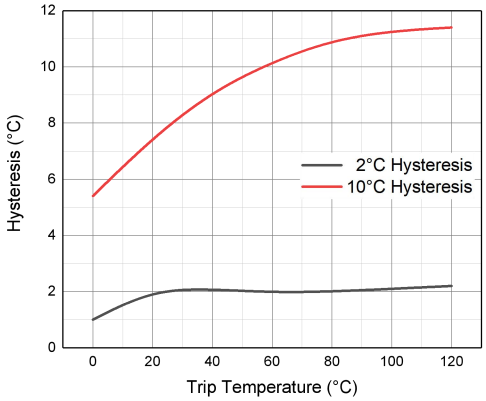
At T_A=+25℃ and VCC =2.7 V to 5.5 V (unless otherwise noted).



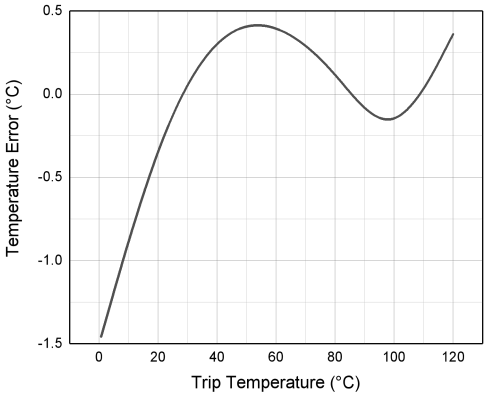
Supply Current vs Temperature



Rset vs Trip Temperature

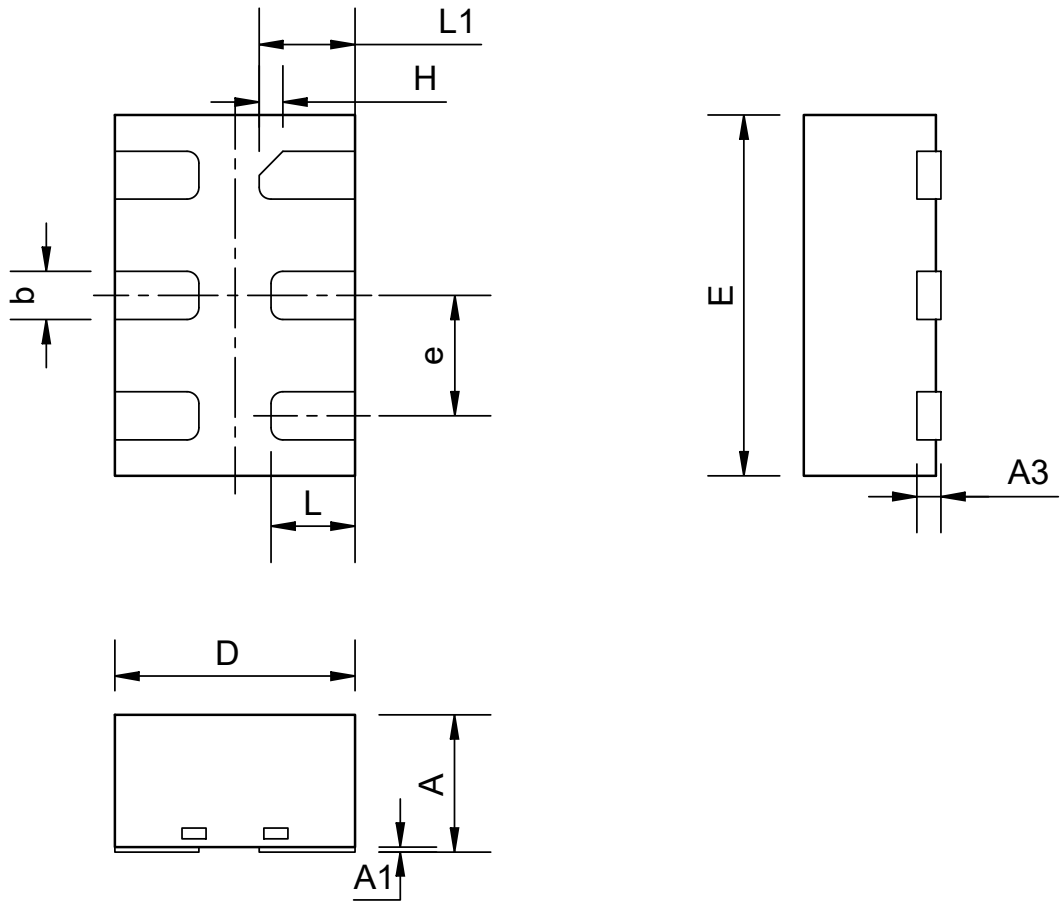


Hysteresis vs. Trip Temperature



Temperature Error vs Trip Temperature

DFN6(1.0×1.5)



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.50	--	0.60
A1	0	0.02	0.05
A3		0.10REF	
b	0.15	0.20	0.25
D	0.90	1.00	1.10
E	1.40	1.50	1.60
e	0.40	0.50	0.60
H		0.10REF	
L	0.30	0.35	0.40
L1	0.35	0.40	0.45

Ordering information

Order code	Package	Baseqty	Deliverymode	Marking
UMW TMP709AIDBVR	SOT23-5	3000	Tape and reel	SBJ U
UMW TMP709D	DFN6	5000	Tape and reel	SBJ U

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