Atmel U4793B

Current Monitor IC

DATASHEET

Features

- 10kV – ESD protection
- Two comparators with common reference
- Tight threshold tolerance
- Constant threshold
- NPN output
- Interference and damage-protection according to VDE 0839 and ISO/CD 7637 EMI protection
- Reversal polarity protection
- Load-dump protection

Description

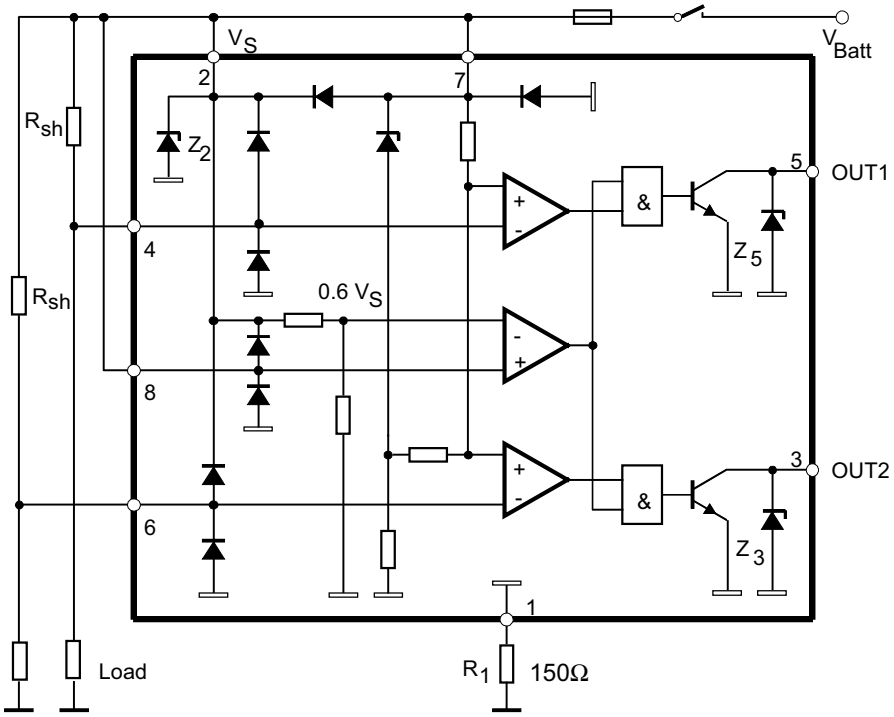
The bipolar Atmel® U4793B is designed to monitor overload or a short circuit in automotive or industrial applications. The threshold is tied to $V_{4,6} = V_S - V_T$ where $V_T = 44.5mV$. It is independent of the supply voltage, V_S. If the voltage drop across shunt resistor, R_{sh}, exceeds this value, the output is turned on, otherwise the output is turned off.

Without supply voltage or open input pin 8, the output is turned off. The output breakdown voltage is determined by the Z-diodes Z_3 and Z_5 with a typical value of $V_Z = 22V$.

An unused comparator input must be connected to pin 7.

1. Block Diagram

Figure 1-1. Schematic and Application Circuit



2. Pin Configuration

Figure 2-1. Pinning SO8

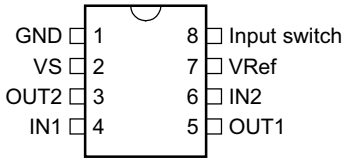


Table 2-1. Pin Description

Pin	Symbol	Function
1	GND	Reference point, ground
2	VS	Supply voltage
3	OUT2	Output 2
4	IN1	Input 1
5	OUT1	Output 1
6	IN2	Input 2
7	VRef	Reference voltage
8	Input switch	Input switch

3. Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Parameters	Symbol	Value	Unit
Supply voltage; pins 2 and 7	V_S	16.5	V
Current consumption t = 2 ms, measured at pin 1 (GND), pin 1	I_1	1.5	A
Output current, pins 3 and 5	$I_{3,5}$	20	mA
Input voltage reference point pin 7, pins 4 and 6	$-V_{4,6}$	6	V
Power dissipation T_{amb} = 125°C T_{amb} = 95°C T_{amb} = 60°C	 P_{tot} P_{tot} P_{tot}	 150 360 560	 mW mW mW
Ambient temperature range	T_{amb}	–40 to +125	°C
Storage temperature range	T_{stg}	–55 to +125	°C
Junction temperature	T_j	150	°C

4. Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient	R_{thJA}	160	K/W

5. Electrical Characteristics

V_S = 9V to 15V, T_{amb} = –40°C to +125°C, unless otherwise specified (see Figure 1-1 on page 2)

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
1	Supply								
1.1	Supply voltage		2, 7	V_S	9		15	V	A
1.2	Internal Z-diode Z_2		2	V_Z	20			V	A
1.3	Current consumption	V_S = 12V measured T_{amb} = –40°C	1	I_1	3.5	4.8	6.0	mA	C
1.4		V_S = 12V measured T_{amb} = 25°C	1	I_1	2.8	3.4	6.0	mA	A
1.5		V_S = 12V measured T_{amb} = 125°C	1	I_1	2.0	2.6	3.2	mA	C

*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

5. Electrical Characteristics (Continued)

V_S = 9V to 15V, T_{amb} = –40°C to +125°C, unless otherwise specified (see Figure 1-1 on page 2)

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
2	Output								
2.1	Output saturation voltage	V_S = 9V, $I_{3,5}$ = 10mA T_{amb} = 25°C	3, 5	V_{sat}			0.5	V	A
2.2	Output Z-diodes Z_3, Z_5		3, 5	V_Z	21			V	A
3	Control Signal								
3.1	Control signal threshold	$I_{3,5}$ = 1mA, Figure 5-1 T_{amb} = –40°C	4, 6	$-V_T$	42	44	46	mV	C
3.2		$I_{3,5}$ = 1mA, Figure 5-1 T_{amb} = 25°C	4, 6	$-V_T$	43	44.5	46	mV	A
3.3		$I_{3,5}$ = 1mA, Figure 5-1 T_{amb} = 125°C	4, 6	$-V_T$	44.5	46	47.5	mV	C
3.4	Temperature coefficient of control signal threshold			TC		15		µV/K	C
3.5	Input currents Pins connected to 12V	T_{amb} = –40°C	4, 6	I_I	100		190	nA	C
3.6		T_{amb} = 25°C		I_I	60	100	150	nA	A
3.7		T_{amb} = 125°C		I_I	30		110	nA	C
3.8	Input currents Pins connected to 12V	T_{amb} = –40°C	8	I_I	5.5		7.0	µA	C
3.9		T_{amb} = 25°C		I_I	4.0	5.0	5.5	µA	A
3.10		T_{amb} = 125°C		I_I	3.0		4.5	µA	C
4	Threshold								
4.1	Threshold voltage	Switch identification T_{amb} = –40°C	8	V_8	0.47 × V_S		0.69 × V_S	V	C
4.2		Switch identification T_{amb} = 25°C		V_8	0.47 × V_S	0.6 V_S	0.69 × V_S	V	A
4.3		Switch identification T_{amb} = 125°C		V_8	0.47 × V_S		0.69 × V_S	V	C
5	Switch Delay (R_L = 10kΩ connected from Pin 3 or Pin 5 to V_{Batt})								
5.1	Delay time Switch-on High to low	T_{amb} = –40°C	3, 5	$t_{d(on)}$	3	4	6	µs	C
5.2		T_{amb} = 25°C		$t_{d(on)}$	4	6	8	µs	C
5.3		T_{amb} = 125°C		$t_{d(on)}$	5	7	9	µs	C
5.4	Delay time Switch-off Low to high	T_{amb} = –40°C		$t_{d(off)}$	16	24	32	µs	C
5.5		T_{amb} = 25°C		$t_{d(off)}$	18	30	50	µs	A
5.6		T_{amb} = 125°C		$t_{d(off)}$	30	50	70	µs	C

*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

Figure 5-1. Timing Diagram

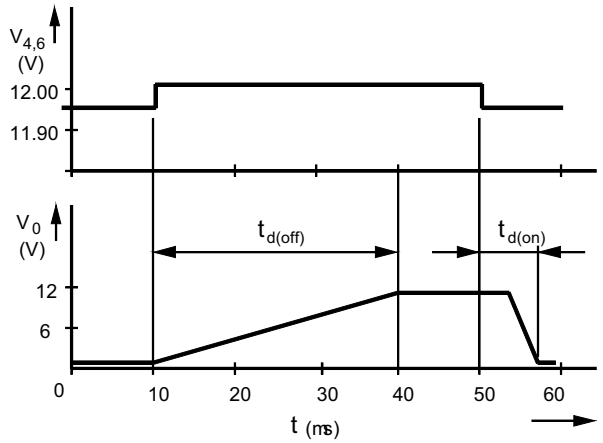
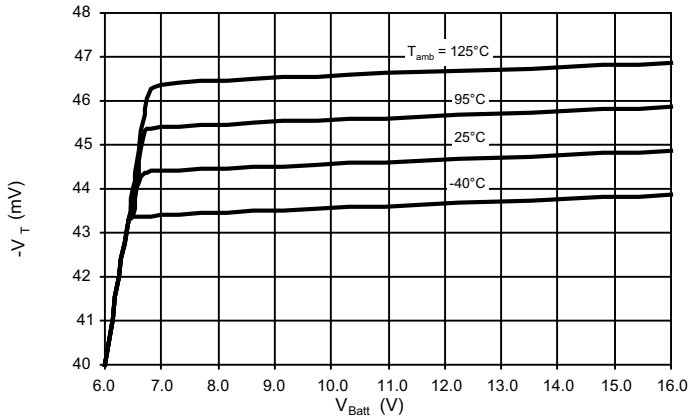


Figure 5-2. Threshold Voltage = f (V_{Batt} and Temperature)



6. Ordering Information

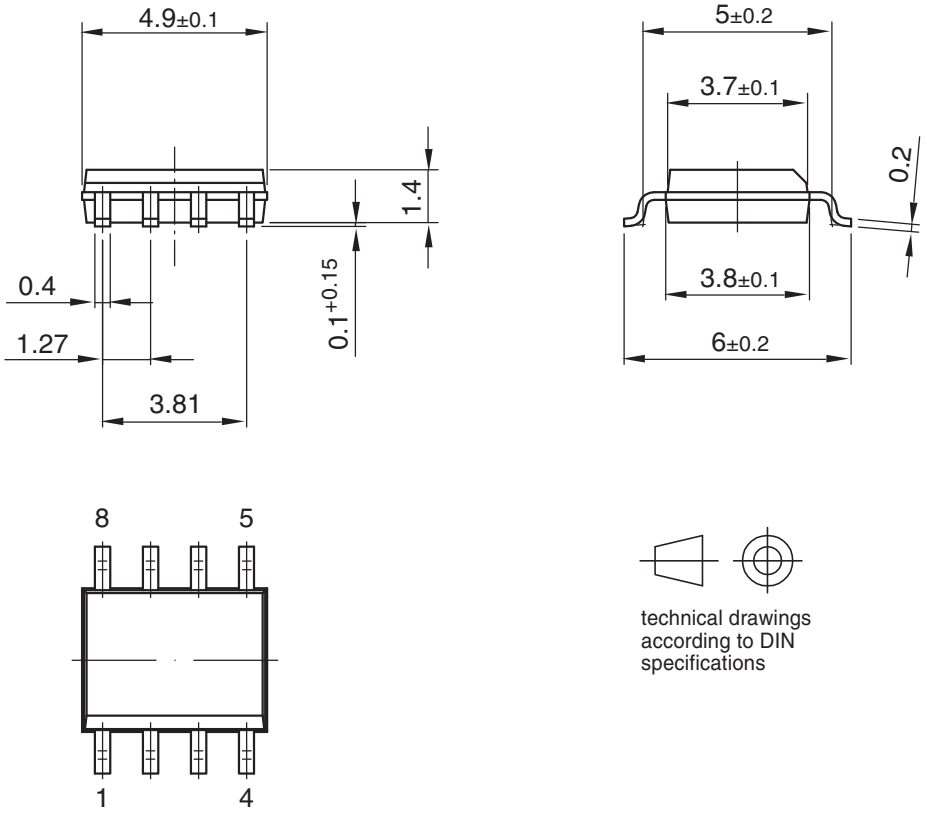
Extended Type Number	Package	Remarks
U4793B-MFPY	SO8	Tube, Pb-free

7. Package Information

Figure 7-1. SO8

Package: SO 8

Dimensions in mm



Drawing-No.: 6.541-5031.01-4

Issue: 1; 15.08.06

8. Revision History

Please note that the following page numbers referred to in this section refer to the specific revision mentioned, not to this document.

Revision No.	History
4557C-AUTO-06/12	• Section 4 “Absolute Maximum Ratings” on page 3 changed • Section 5 “Thermal Resistance” on page 3 changed • Section 7 “Ordering Information” on page 6 changed • Section 8 “Package Information” on page 6 changed
4557B-AUTO-09/05	• Put datasheet in a new template • Pb-free logo on page 1 added • Ordering Information on page 6 changed

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