SIEMENS

Current-Monitoring IC

TLE 4951

Preliminary Data

Bipolar IC

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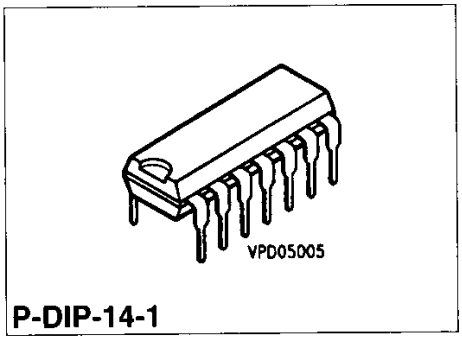
Features

- Input currents max 25 µA, protective resistors can be connected in series
- Effective protection against destruction by excessive voltages such as load dump pulses occuring in cars
- Supply voltage range from 4.5 to 32 V
- Input voltage range up to 32 V, independent of supply voltage
- Switching threshold of comparators dependent on supply voltage, corresponding to the characteristic of light bulbs
- Temperature range: – 40 to 125 °C



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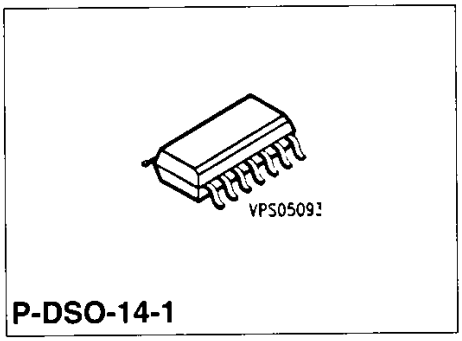

P-DSO-14-1

Applications

Current monitoring of

- light bulbs
- electric motors
- relays
- glow plugs
- circuits

especially suitable for:

- automotive electronics
- industrial plants

	Type	Ordering code	Package
S ■	TLE 4951	Q67000-A8266	P-DIP-14-1
S ■	TLE 4951 G	Q67000-A8267	P-DSO-14-1 (SMD)

■ Not for new design

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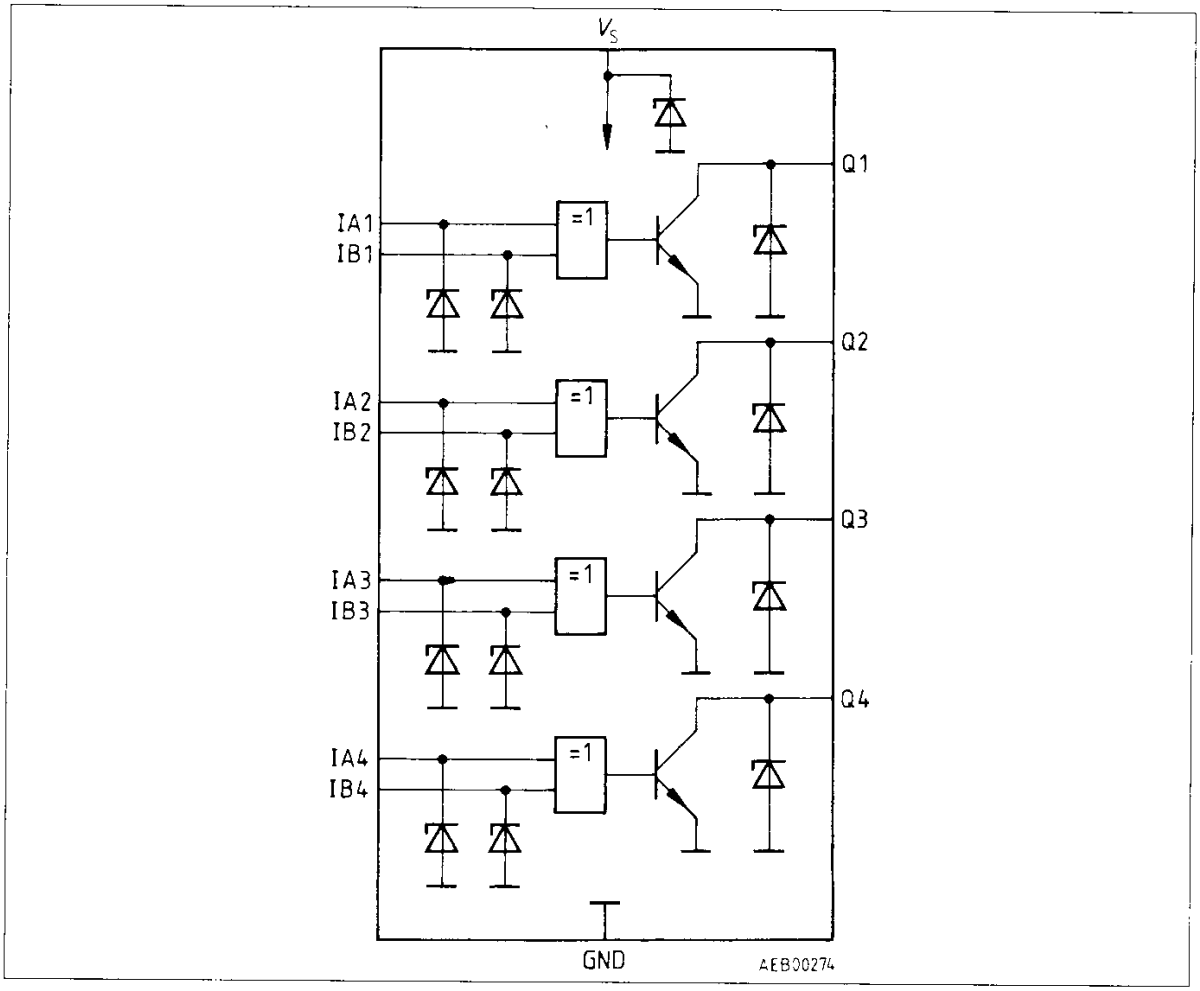
The TLE 4951 is designed to monitor the correct function of circuits, in particular those of light bulbs in cars. The IC comprises four identical comparator stages, the logic function of which corresponds to an exclusive-OR gate. With each comparator, pairs of lamps or single lamps can be monitored by means of the voltage drops across shunt resistors (R_{sh}) in the positive supply line (see **application circuits 1 and 2**).

Due to small differential input currents it is possible to connect protective resistors (R_s) in series. This provides a high degree of **protection against destruction** by interfering voltages occuring in automobiles.

Functional Description

The component incorporates four identical comparator circuits. Each of these functional units has two equivalent inputs and one open-collector output Q. If the voltages differ by more than approx. 15 mV, the switching state changes from H (OFF-state) to L (ON-state).

For an input voltage < 4.5 V at both the inputs, the output can switch to H independently of the differential input voltage. For an input voltage < 2.0 V the output is reliably OFF-state.



Block Diagram

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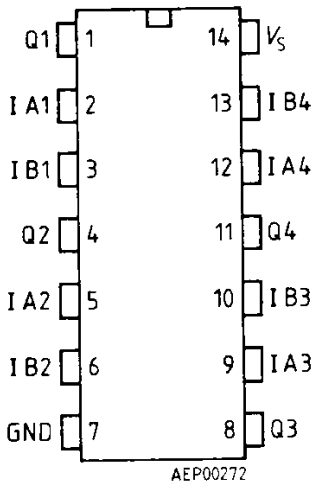
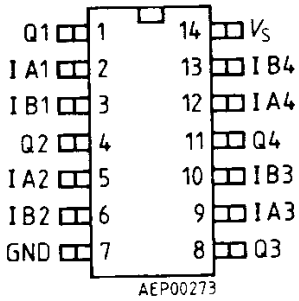
TLE 4951



TLE 4951 G



Pin Configurations
(top view)

Pin Definitions and Functions

Pin	Symbol	Function
1	Q1	Output 1
2 3	IA1 IB1	Input A1 Input B1
4	Q2	Output 2
5 6	IA2 IB2	Input A2 Input B2
7 8	0s Q3	GND Output 3
9 10	IA3 IB3	Input A3 Input B3
11	Q4	Output 4
12 13	IA4 IB4	Input A4 Input B4
14	V_S	Supply voltage

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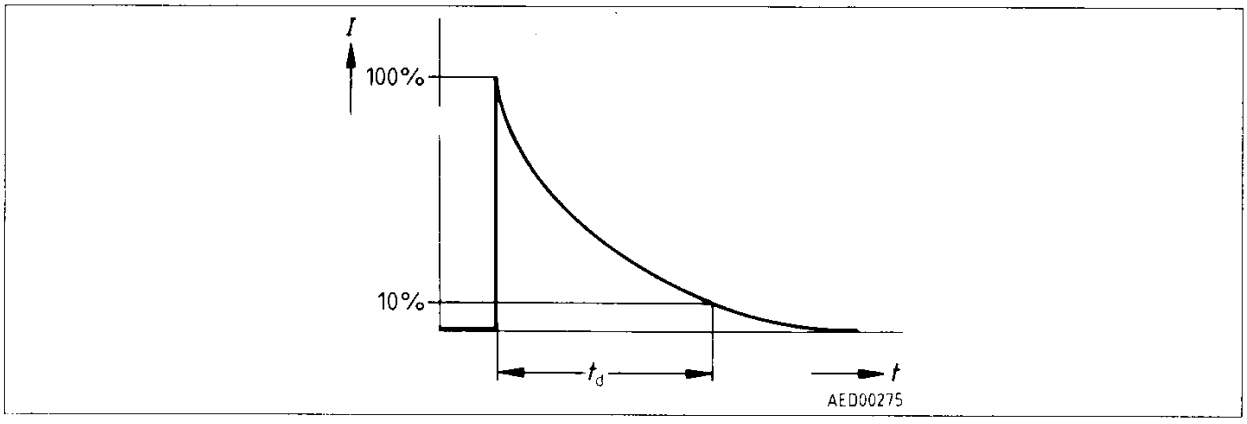
Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		
Supply voltage	V_S	– 0.5	32	V	
Input voltages	$V_{A,B}$	– 45	45	V	
Output voltage	V_Q	– 0.5	32	V	
Output current	I_Q		40	mA	
Current through protecting structures					
at the supply terminal	I_S	– 600	600	mA	$t_d < 2$ ms
at the outputs Q	I_{SQ}	– 400	400	mA	$t_d < 2$ ms
Thermal resistance					
system - air TLE 4951	$R_{th\,SA}$		75	K/W	
system - air TLE 4951 G	$R_{th\,SA}$		125	K/W [1]	

[1] 75 K/W ceramic substrate

Operating Range

Parameter	Symbol	Limit Values		Unit
		min.	max.	
Supply voltage	V_S	4.5	32	V
Ambient temperature	T_A	– 40	125	°C
Common-mode input voltage range independent of V_S	V_{IC}	4.5	32	V
Differential input voltage	V_{ID}		100	mV



Permissible short-term overvoltages with series resistors R_S:

$+ V(V_{S;Q}) = I_{S;Q} \times R_V(V_{S;Q}) + 32$ V

$- V(V_{S;Q}) = - I_{S;Q} \times R_V(V_{S;Q})$

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Characteristics

T_A = – 30 to 110 °C; V_S = 10 to 16 V

Parameter	Symbol	Limit Values			Unit	Test Condition	Test Circuit
		min.	typ.	max			
Current consumption	I_S			3 8	mA mA	Q1 = Q2 = Q3 = Q4 = H Q1 = Q2 = Q3 = Q4 = L	1
Switching threshold							
with $R_{SA, B}$	V_{Diff} [1]	7	14	20	mV	V_S = 13.5 V, R_S = 1 kΩ	2
without $R_{SA, B}$	V_{Diff} [1]	4	8	12	mV	V_S = 13.5 V	1
with $R_{SA, B}$	V_{Diff}	2		14	mV	4.5 V < V_S < 5.5 V, R_S = 1 kΩ	2
without $R_{SA, B}$	V_{Diff}	1.5		8	mV	4.5 V < V_S < 5.5 V	1
Input current	$I_{A, B}$			25	µA	$V_A = V_B$	1
Output saturation voltage	V_{QL}			0.4	V	I_Q = 30 mA	1
Output reverse current	I_{QH}			10		V_{QH} = 32 V	1

[1] $V_{Diff} = |V_A - V_B|$

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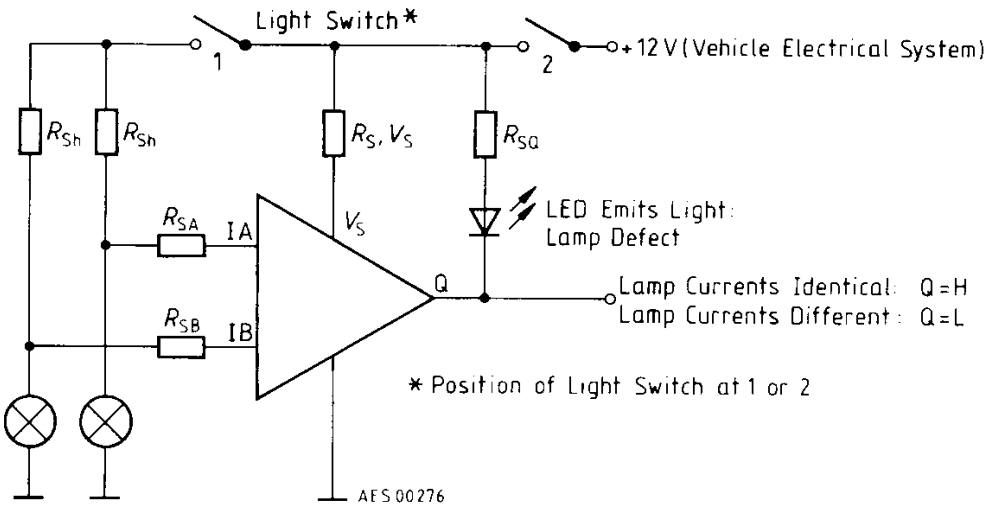
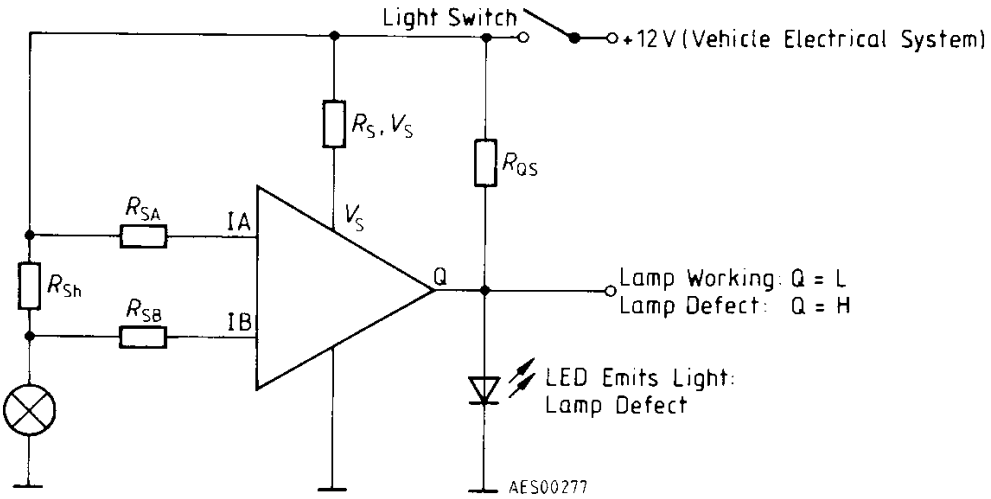
1. Differential measurement



2. Absolute-value measurement



Application Circuits

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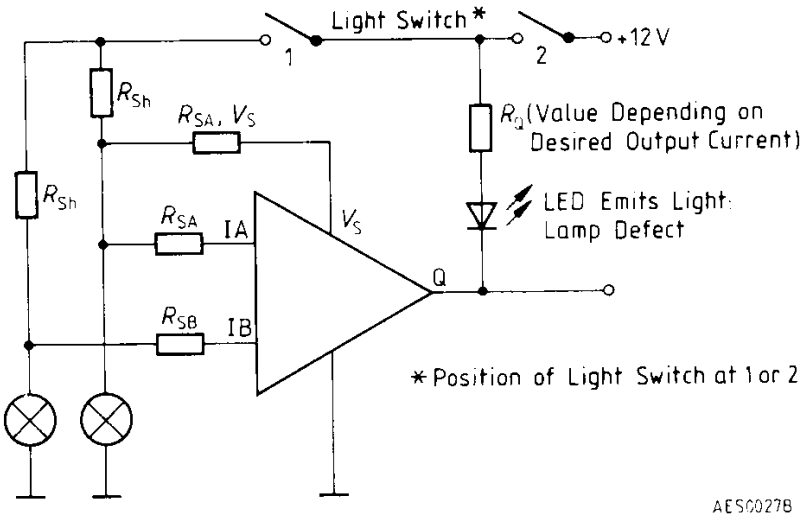
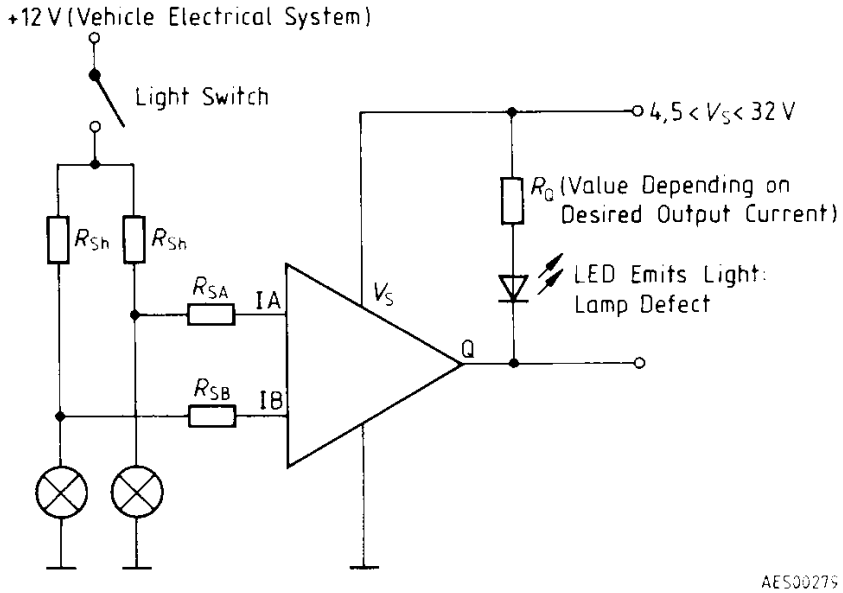
3. Supply from shunt resistor (function as "1": Differential measurement)



Recommended Protective Resistors: $R_{SA,B}$ = 1kΩ
R_{SA},V_S = 100Ω

4. Voltage supply separated from vehicle electrical system (function as "1": Differential measurement)



Recommended Protective Resistors: $R_{SA,B}$ = 1kΩ

Applications Circuits (cont'd)

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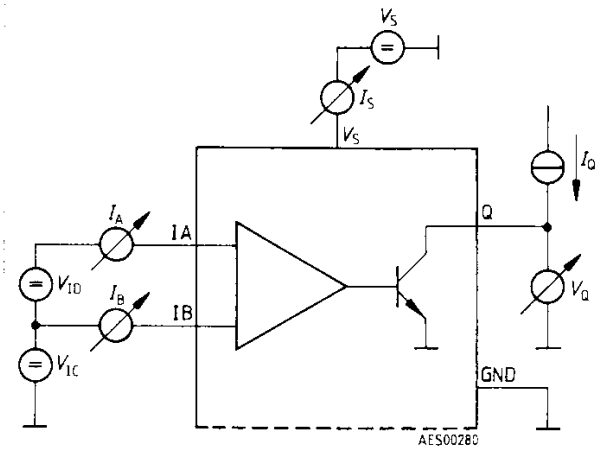
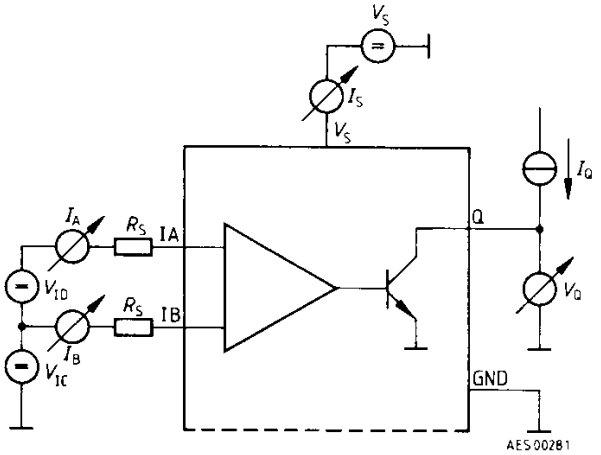
Test Circuit 1

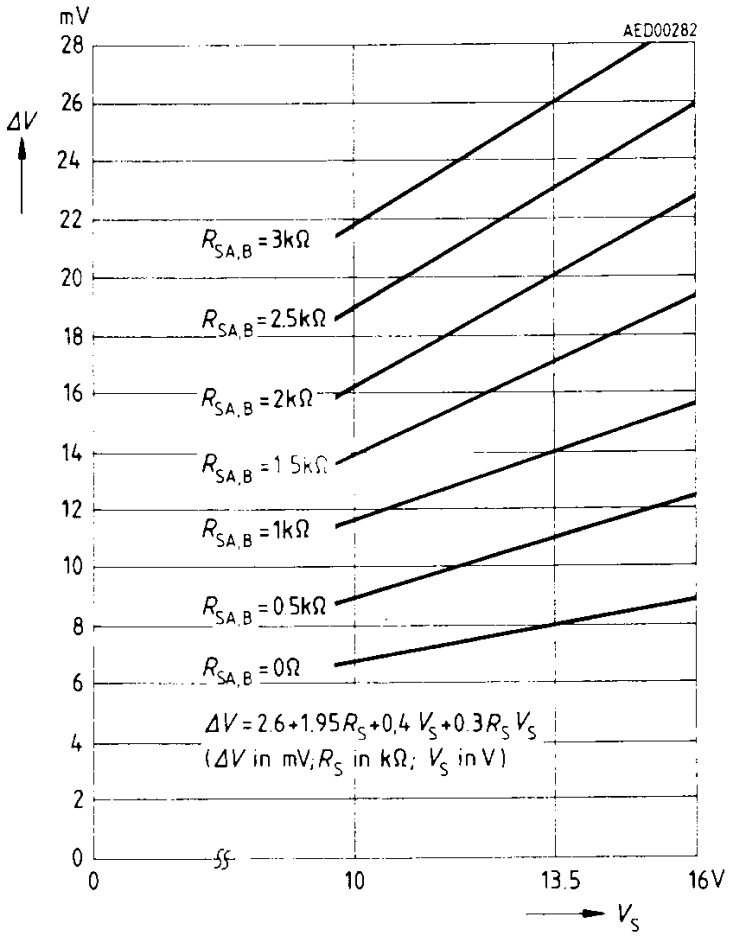


Test Circuit 2



Differential Switching Voltage versus Supply Voltage

Parameters: protective resistors at the inputs $R_{SA,B}$



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