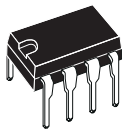
TDE1767
TDE1787

Interface circuit (relay and Lamp-driver)

Features

- Open ground protection
- High output current
- Adjustable short-circuit protection
- Internal thermal protection with external reset
- Large supply voltage range
- Alarm output
- Input voltage can be higher than V_{CC}
- Output voltage can be lower than ground (V_{CC} - $V_O \leq V_{CC[max]}$)



DIP-8

Description

The TDE1767, TDE1767A, TDE1787, TDE1787A are a monolithic amplifiers designed for high current and high voltage applications, specifically to drive lamps, relays, stepping motors.

The devices are assentially blow-out proof. The output is prois protected from short-circuits with the positive supply or drive. In addition thermal shut down is provited to keep the IC from overheathing.

If internal dissipation becomes too high, the driver will shut down to prevent excessive heating. The output stays null after the overheating is off, if the reset input is low. If high the output will alternatively switch-on and off until the overload is removed.

The devices operates over a wide range voltages from standard 15V operational amplifier supplies to the single +6V or +48V used for industrial electric systems. Input voltages can be higher than in the V_{CC}.

An alarm output suitable for driving a LED is provited. This LED, normally on (if referred to ground), will die out or flash during an overload depending on the state of the reset input.

The output is low in open ground conditions.

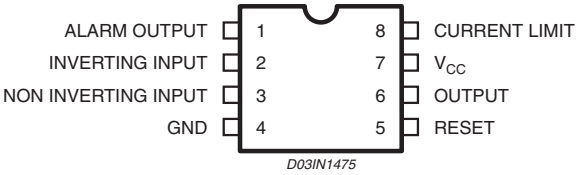
Table 1. Device summary

Part number	Package	Packaging
TDE1767DP	DIP8	Tube
TDE1767ADP	DIP8	Tube
TDE1787DP	DIP8	Tube
TDE1787ADP	DIP8	Tube

Contents

1 Pin connections

Figure 1. Pin connection (top view)



2 Maximum ratings

2.1 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	TDE1767A TDE1787A	TDE1767 TDE1787	Unit
V_{CC}	Supply voltage	60	50	V
V_{ID}	Input differential voltage	60	50	V
V_I	Input voltage	- 10 to + 60	- 10 to + 50	V
I_O	Output current	1.3	1.2	A
$V_{I(reset)}$	Reset input voltage	- 0.5 to + 60	- 0.5 to + 50	V
I_{OA}	Alarm output current	- 10 to + 20	- 10 to + 20	mA
P_{tot}	Power dissipation	Internally Limited		mW
T_{oper}	Operating ambient temperature range	- 25 to + 85	- 25 to + 85	°C
T_{stg}	Storage temperature range	- 65 to + 150	- 65 to + 150	°C

2.2 Thermal data

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{th(JC)}$	Thermal resistance junction-case	max 30	°C/W
$R_{th(JA)}$	Thermal resistance junction-ambient	max 80	°C/W

Note: Devices bonded on a 40 cm2 glass-epoxy printed circuit 0.15 cm thick with 4 cm2 of copper.

3 Electrical characteristcs

TDE1767A: - 25°C ≤ T_A ≤ 85°C, 6V ≤ V_{CC} ≤ 55V, I_o ≤ 500mA, T_J ≤ 150°C

TDE1767: - 25°C ≤ T_A ≤ 85°C, 6V ≤ V_{CC} ≤ 45V, I_o ≤ 500mA, T_J ≤ 150°C

TDE1787A: - 25°C ≤ T_A ≤ 85°C, 6V ≤ V_{CC} ≤ 55V, I_o ≤ 300mA, T_J ≤ 150°C

TDE1787: 25°C ≤ T_A ≤ 85°C, 6V ≤ V_{CC} ≤ 45V, I_o ≤ 300mA, T_J ≤ 150°C

Unless otherwise specified.

Table 4. Electrical characteristics

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{IO}	Input offset voltage	(note 1)		2	50	mV
I_{CC}	Power supply current	(measured on pin 4)				
		Output high (T_A = 25°C)		5.8	8	mA
		Output high (V_{CC} = V_{CCmax}, (T_J = 150°C)		5	7	mA
		Output low (V_{CC} = V_{CCmax}, (T_A = 25°C)		1.5	4	mA
I_{IB}	Imput bias current			15	100	µA
V_{CM}	Common-mode input voltage range	TDE1787A, TDE1767A TDE1787, TDE1767	1 1		60 45	V V
V_I	Input voltage range	Vref ≥ 1V (figure1, note2) TDE1787A, TDE1767A TDE1787, TDE1767	 1 1		 60 45	 V V
I_{SC}	Short circuit output current	V_{CC} = 35V, t = 10ms **TDE1767A:** R_{SC} = 0.22Ω **TDE1787A:** R_{SC} = 0.33Ω		 700 380		 mA mA
V_{sense}	Output limit sense voltage	V_O = V_{CC} -2V, t = 10ms	130	150	170	mV
V_{sense}	Output limit sense voltage	V_O = 0V, t = 10ms	120	140	165	mV
$V_{O(sat)}$	Output saturation voltage	Output high V_I^+- V_I^- ≥ 50mV; R_{SC} = 0; V_{CC} = 30V TDE1787A, TDE1767A: T_J = 25°C TDE1787, TDE1767: T_J = 25°C TDE1787A, TDE1767A: T_J = 150°C TDE1787, TDE1767: T_J = 150°C		 1 1 1.1 1.1	 1.1 1.2 1.2 1.3	 V V V V
I_{OL}	Output leakage current	Output low			100	µA

Table 4. Electrical characteristics (continued)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
I_A	Available alarm output current	Output source current $V_{AH} = V_{CC}$-2.5V	-4	-5		mA
		Output sink current (in thermal shut-down) V_A = 1.4V	5	10		mA
I_{reset}	Reset input current			2	40	µA
$V_{th\text{-}reset}$	Reset threhold			1.4		A
	Output leakage current	open ground		10		µA

Note: 1 The offset voltage given is the maximum value of different input voltage reguired to drive the output voltage whitin 2 V of the ground or the supply voltage.

2 Input voltage range is indipendent of the supply voltage.

4 Schematic diagrams

Figure 2. Schematic diagram

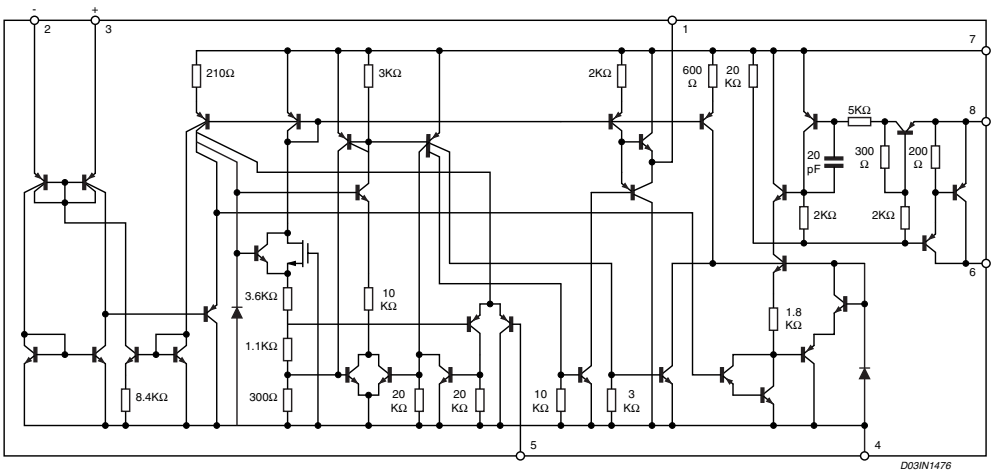
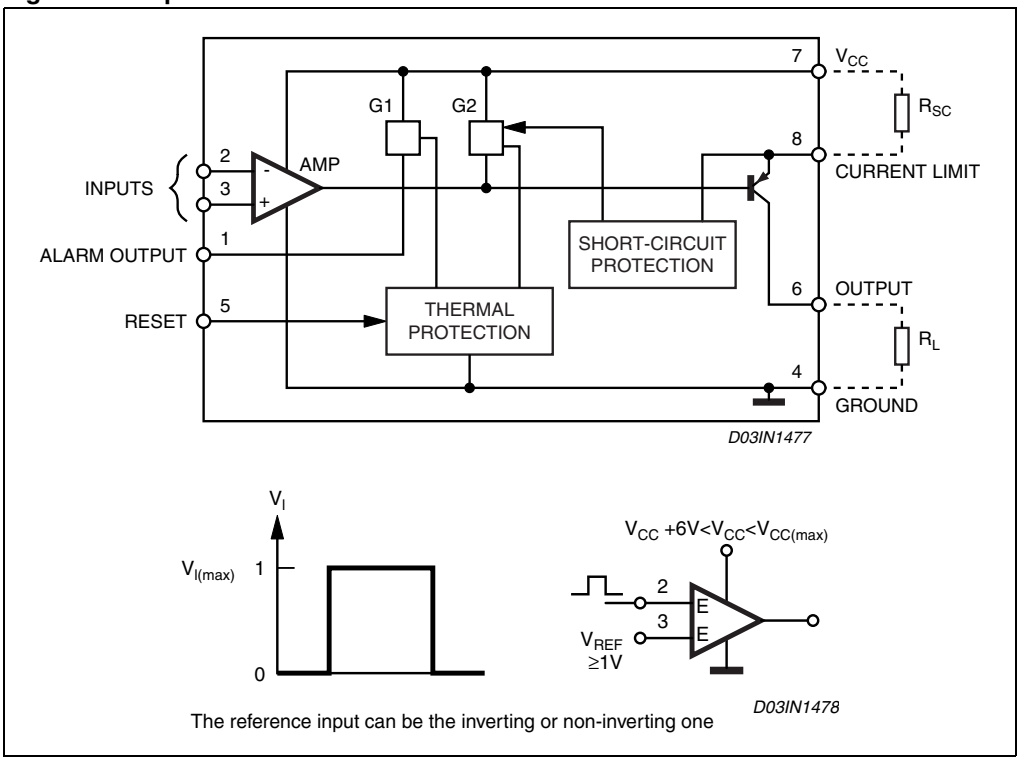


Figure 3. Equivalent schematic



5 Typical characteristics

Figure 4. Peak short-circuit vs limiting resistor

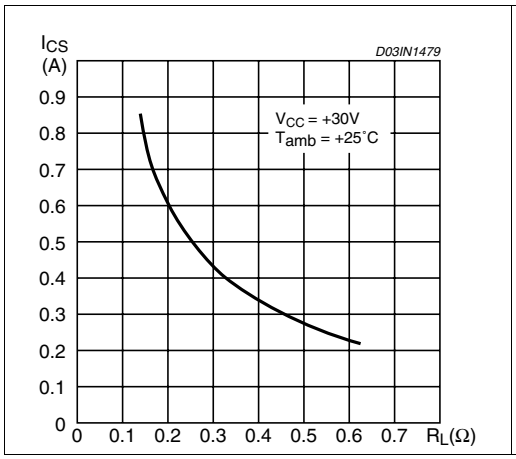


Figure 5. Available output current vs limiting resistor

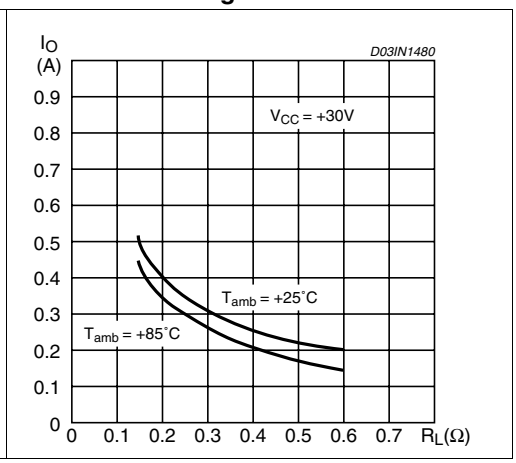


Figure 6. Power supply current (pin 4)

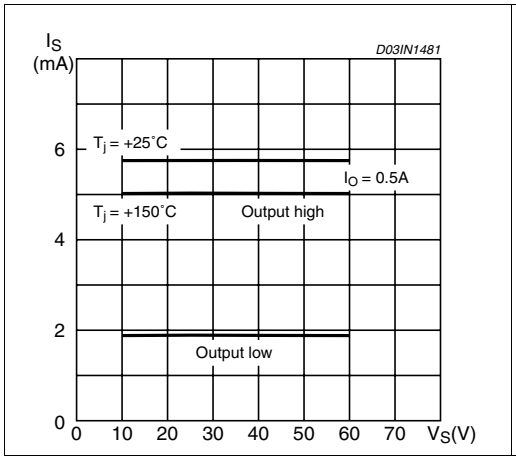


Figure 7. Output saturation voltage vs output current

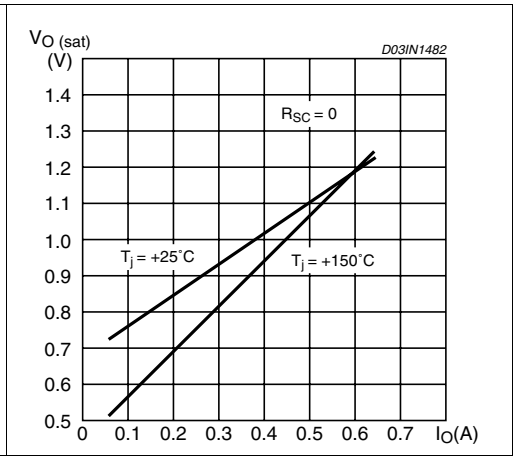


Figure 8. Output transistor safe operating area (pulsed))

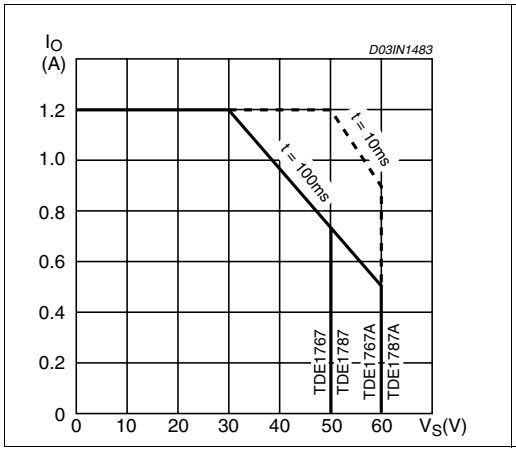


Figure 9. Normal operating area (short circuit protected)

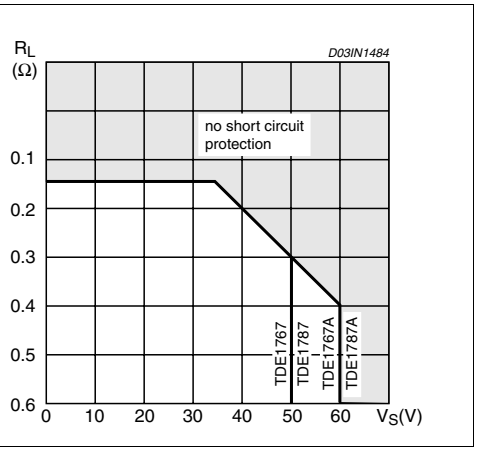


Figure 10. Current sinking

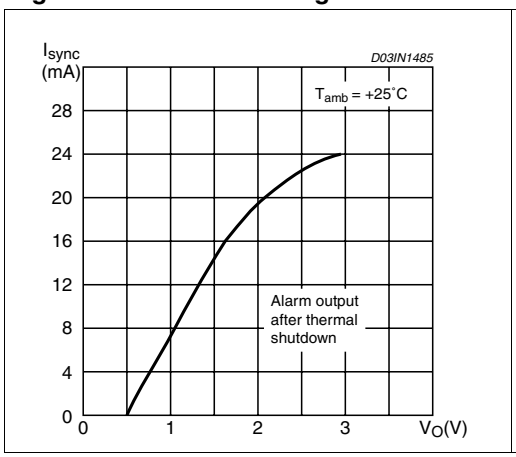


Figure 11. Current sourcing

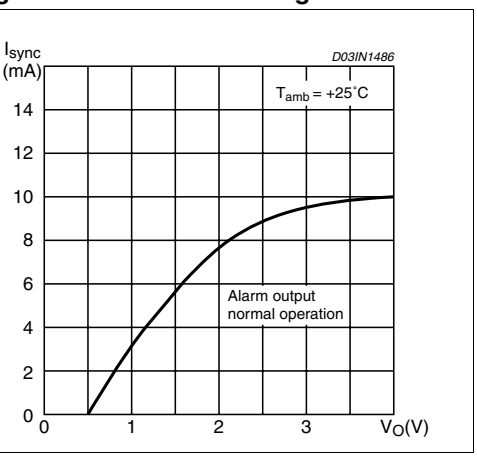


Figure 12. Response time

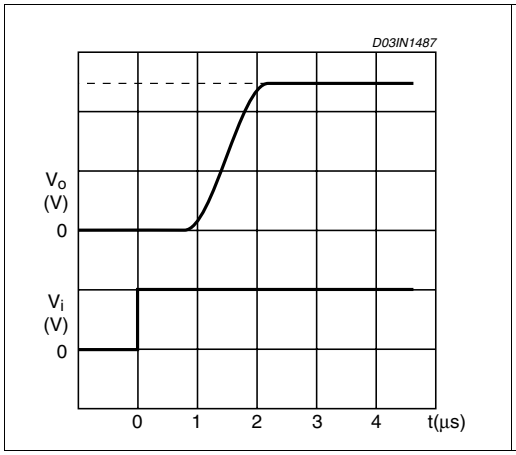
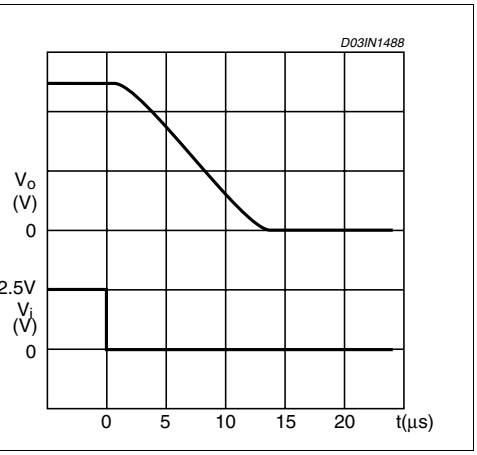


Figure 13. Response time



6 Typical application

Figure 14. Test circuit

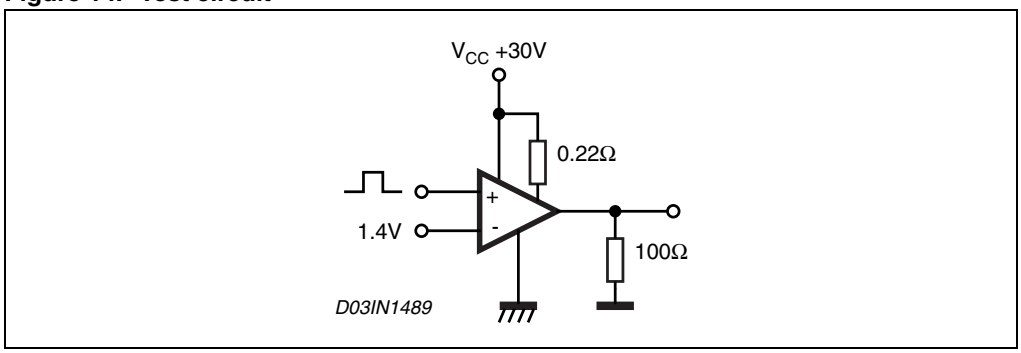


Figure 15. Open load detection.4

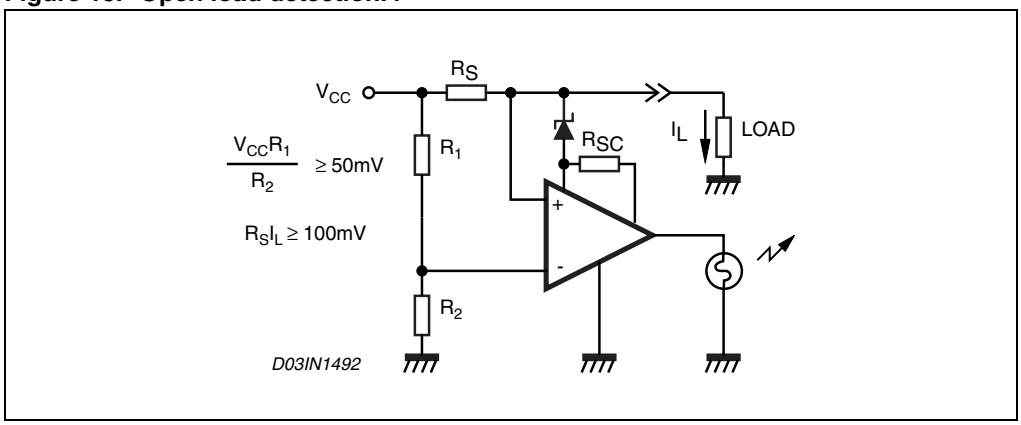


Figure 16. Driving lamps, relays, etc...

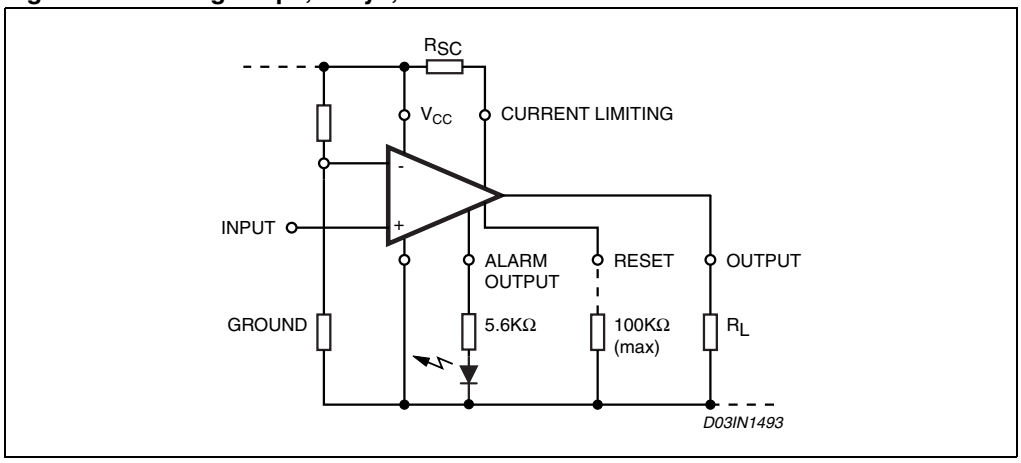


Figure 17. Common reset.

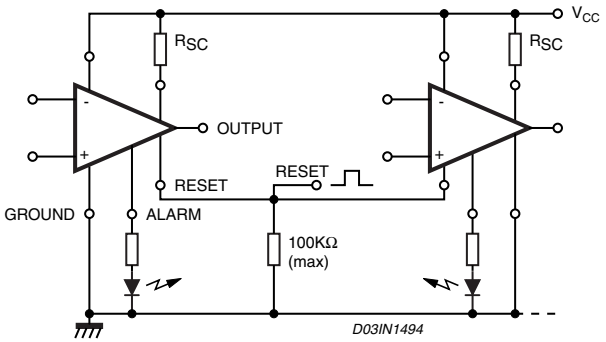
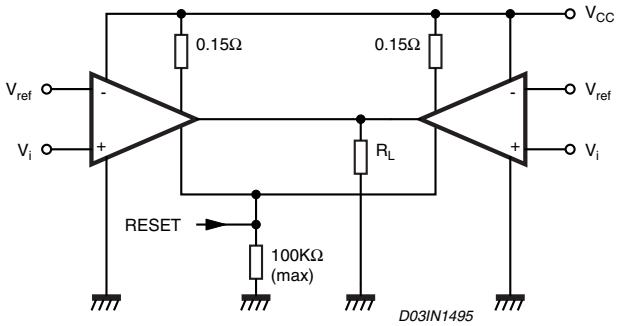


Figure 18. Parallel driving of loads up to 1 A.



7 Using alarm output

Figure 19. Parallel alarm output

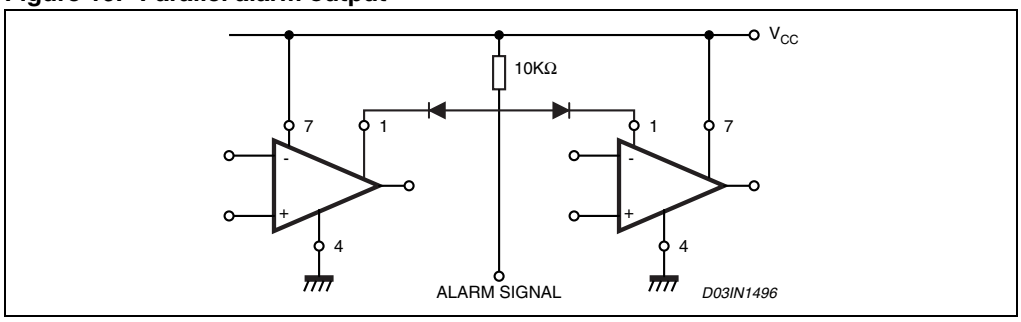


Figure 20. LED to VCC

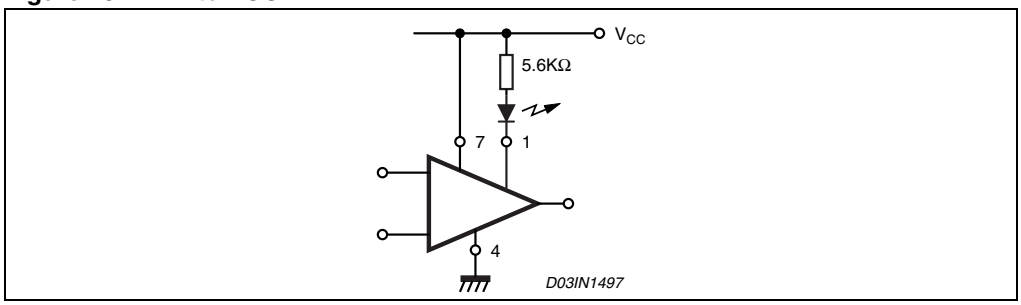


Figure 21. LED to ground

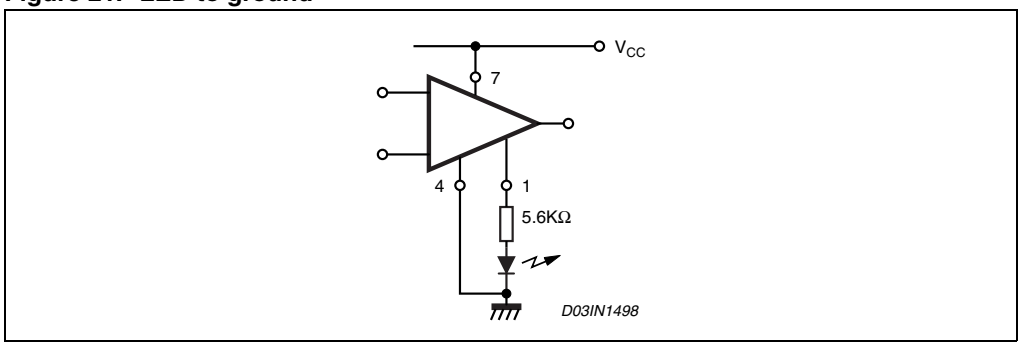


Figure 22. Interface between high voltage and low voltage system.

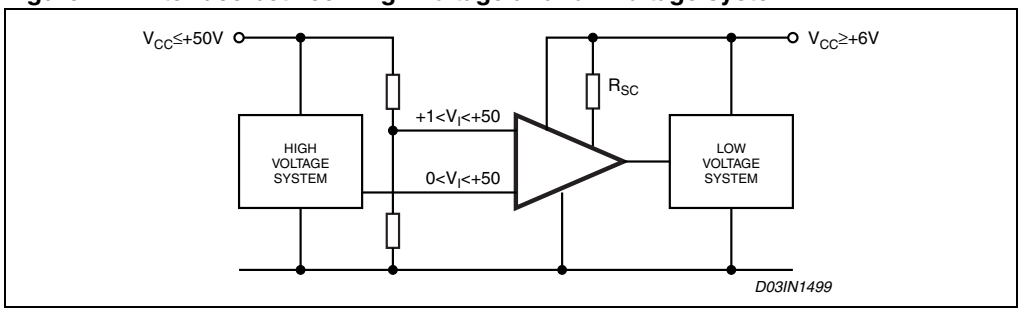
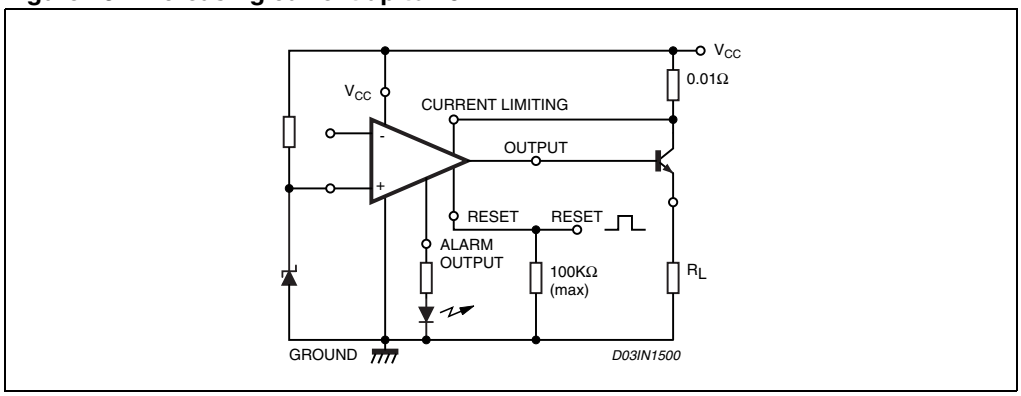


Figure 23. Increasing current up to 10A.



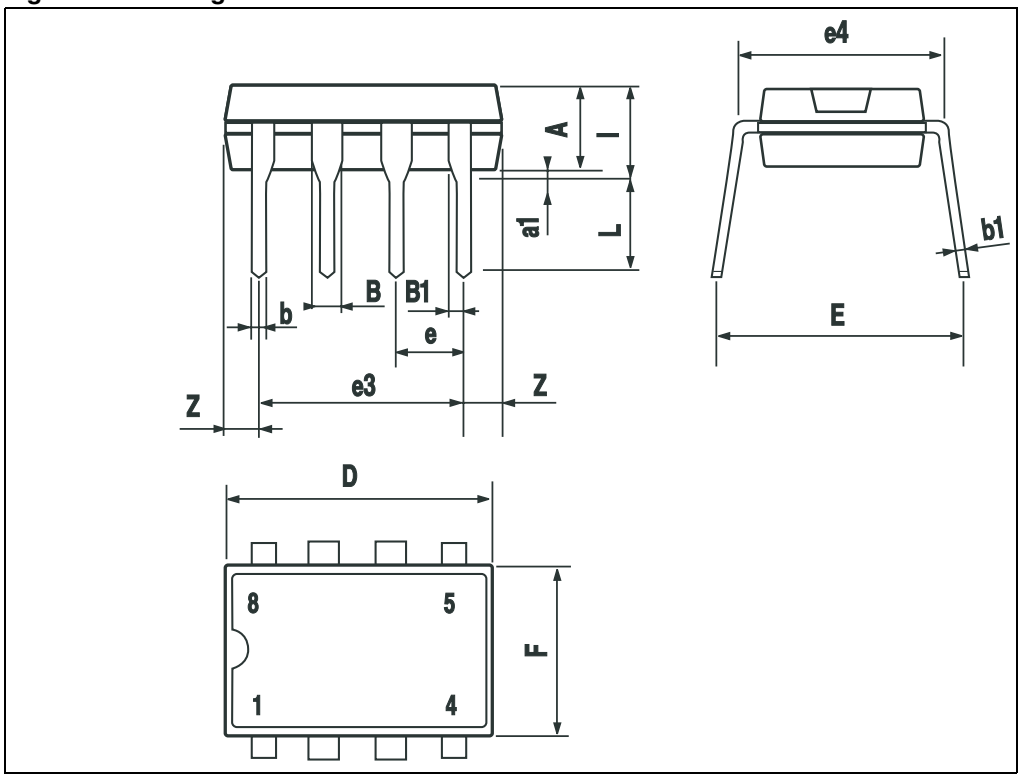
8 Mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

Table 5. DIP-8 Mechanical data

Dim.	mm			Inch		
	Min	Typ	Max	Min	Typ	Max
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
I			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

Figure 24. Package dimensions



9 Revision history

Table 6. Revision history

Date	Revision	Changes
20-Sep-2003	1	Initial release.
3-Mar-2007	2	Document reformatted, typo *Figure 1 on page 3*

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