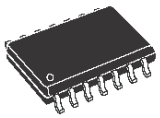
TDE1747

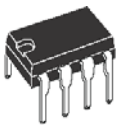
Interface circuit - relay and lamp-driver

Features

- Open ground protection
- High output current
- Adjustable short-circuit protection to ground
- Thermal protection with hysteresis to avoid the intermediate output levels
- Large supply voltage range: + 8V to +45V
- Short-circuit protection to V_{CC}



SO14



DIP-8

Description

The TDE1747 is a monolithic comparator designed for high current and high voltage applications, specifically to drive lamps, relays, stepping motors.

This device is essentially blow-out proof. Current limiting is available to limit the peak output current to safe values.
Adjustment only requires one external resistor. In addition, thermal shut down is provided to keep the IC from overheating. If internal dissipation becomes too high, the driver will shut down to prevent excessive heating. TDE1747 has an open ground protection. The output is also protected from shortcircuits with the positive power supply. The device operates over a wide range of supply voltages from standard ± 15V operational amplifier supplies down to the single +12V or +24V used for industrial electronic systems.

Order codes

Part number	Temp range, °C	Package	Packing
TDE1747DP	-25°C to +85°C	DIP-8	Tube
TDE1747FP	-25°C to +85°C	SO14	Tube
TDE1747FPT	-25°C to +85°C	SO14	Tape and reel

Contents

1 Maximum ratings

1.1 Absolute maximum ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	50 (1)	V
V_I	Input voltage	50	V
V_{ID}	Differential input voltage	50	V
I_O	Output current	1	A
P_{tot}	Power dissipation (T_A = +25°C)	Internally Limited	W
T_{oper}	Operating Free–air Temperature Range	– 25 to + 85	°C
T_{STG}	Storage temperature range	– 65 to + 150	°C

1. 60V, t ≤10ms

1.2 Thermal data

Table 2. Thermal data

Symbol	Description	Value	Unit
R_{thJA}	Thermal Resistance Junction-ambient	120	°C/W
R_{thJC}	Thermal Resistance Junction-case	50	°C/W
R_{th}	Junction-ceramic Substrate (case glued to substrate) SO14	90	°C/W
R_{th}	Junction-ceramic Substrate (case glued to substrate, substrate temperature maintained constant) SO14	65	°C/W

2 Electrical characteristics

$T_J = -25$ to $+85°C$, $V_{CC} = 8$ to 45 V, unless otherwise specified (note 1)

Table 3. Electrical characteristics

Symbol	Parameter	Min	Typ	Max	Unit
V_{IO}	Input offset voltage (2)	–	2	50	mV
I_{IB}	Input bias current	–	0.1	1.5	mA
I_{CC}	Supply Current (V_{CC} = +24V, I_O = 0) High level Low level	 – –	 4 2	 6 4	 mA mA
$V_{I(max)}$	Common–mode input voltage range	2	–	V_{CC}–2	V
I_{SC}	Short–circuit Current Limit (T_A = 25°C, V_{CC} = +24V) R_{SC}= 1.5Ω R_{SC}= ∞	 – –	 480 35	 – 50	 mA mA
V_{CC}–V_O	Output saturation voltage (output low) ($V_I^+ - V_I^- \geq$ 50mV, R_{SC} = 0, I_O = 300mA,) T_J = + 25°C T_A = + 25°C	 – –	 1.15 1.05	 1.4 1.3	 V V
I_{OL}	Output leakage current (output high) (V_O = 0, V_{CC} = +24V, T_A = + 25°C)	–	0.01	10	µA

1. For operating at high temperature, the TDE1747, must be derated based on a +150°C maximum junction temperature and junction-ambient thermal resistance of 120°C/W for DIP-8 and 100°C/W for the SO14.
2. The offset voltage given is the maximum value of input voltage required to drive the output voltage within 2V of the ground or the supply voltage.

3 Pin connections and schematic diagrams

Figure 1. Pin connections (top views)

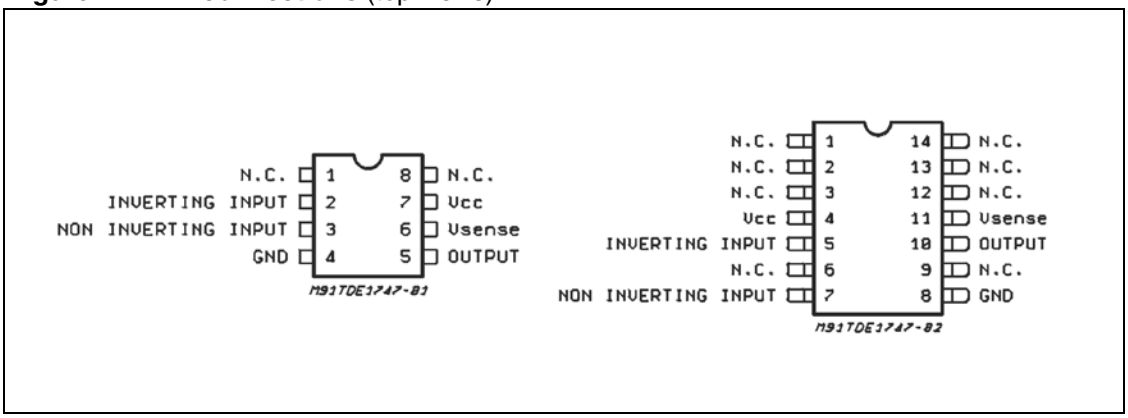


Figure 2. Schematic diagram

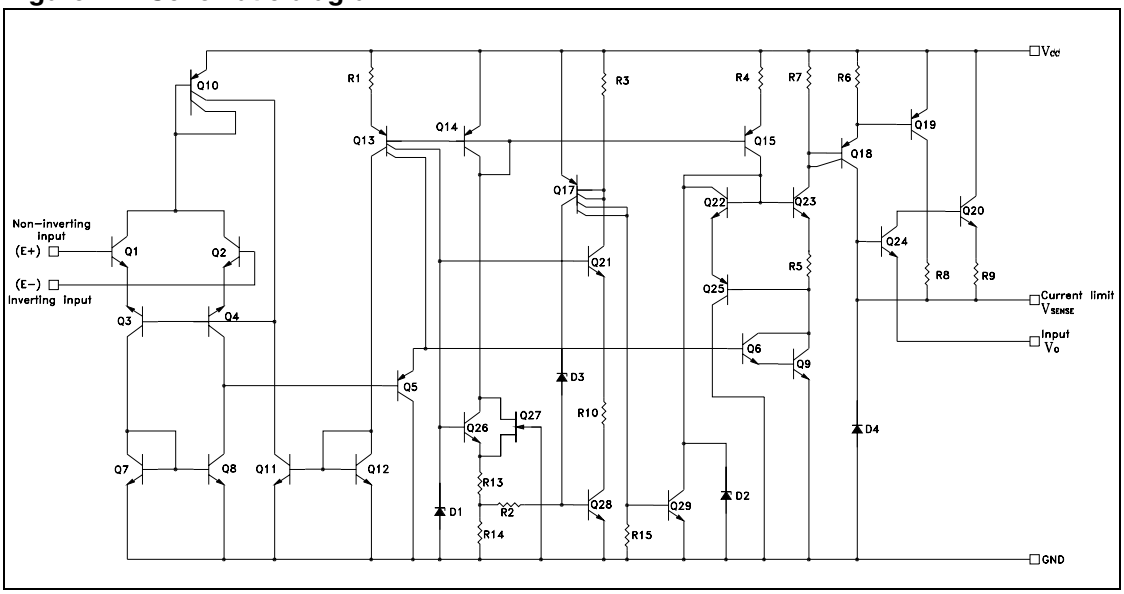


Figure 3. Test circuit

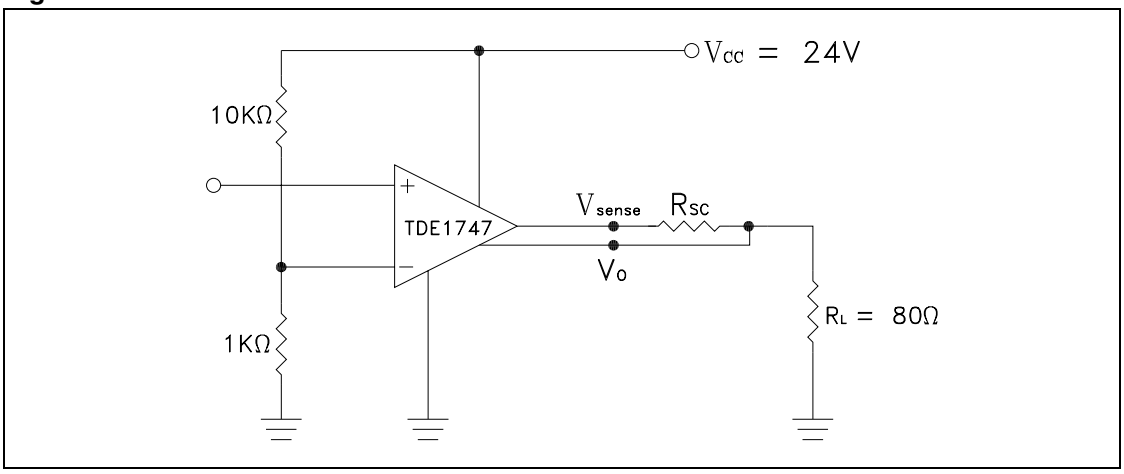
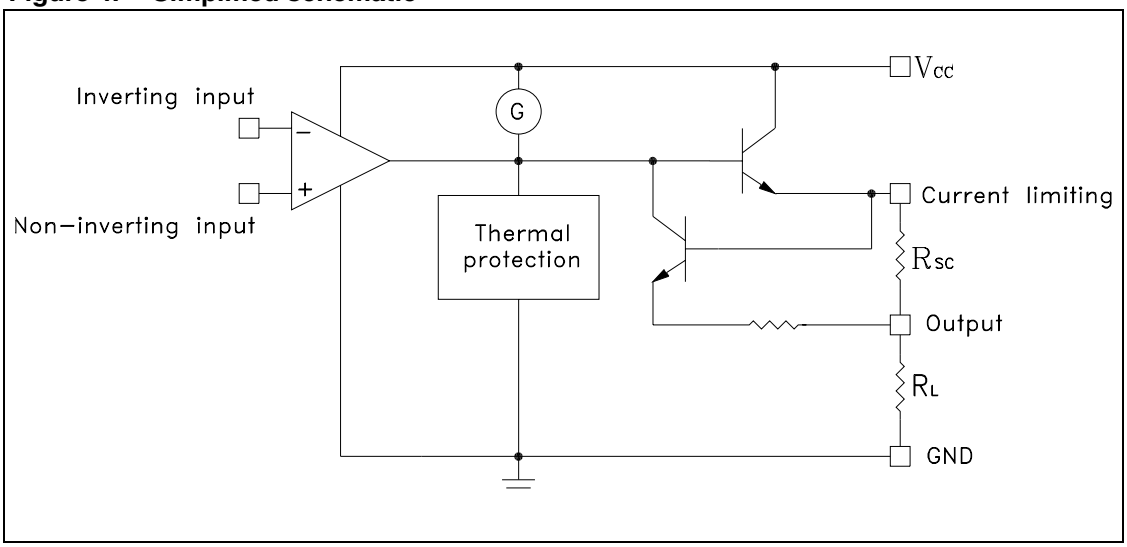


Figure 4. Simplified schematic



4 Typical characteristics

Figure 5. Available output current vs limiting resistors

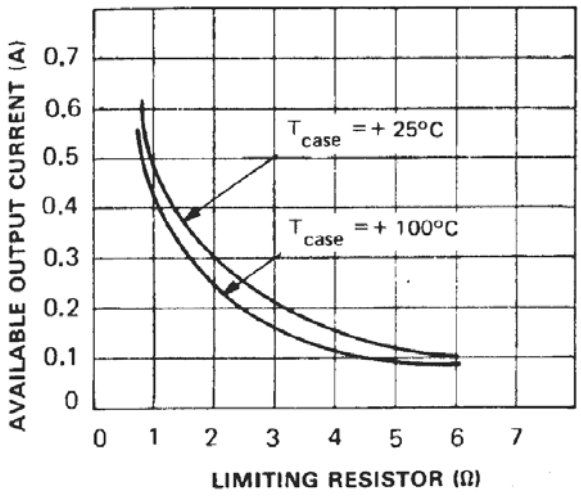


Figure 6. Peak short-circuit vs limiting resistor

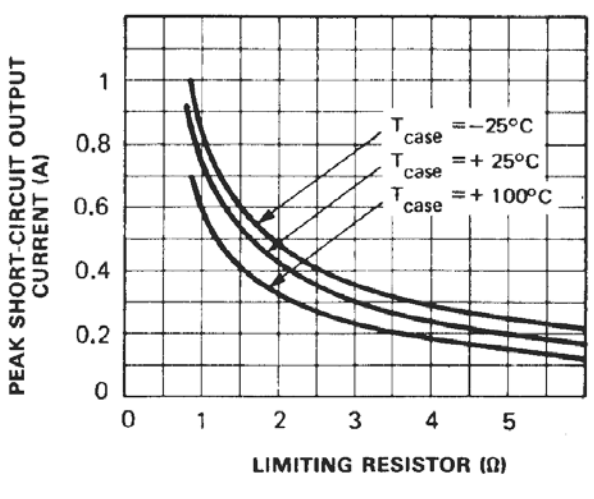


Figure 7. Short-circuit current vs case temperature

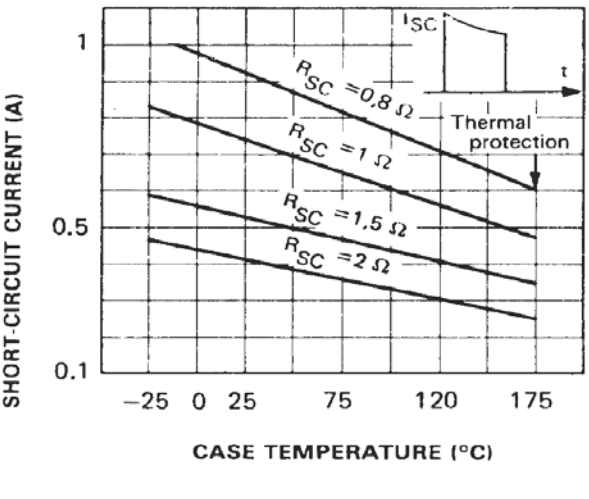


Figure 8. Minimum limiting resistor value vs supply voltage

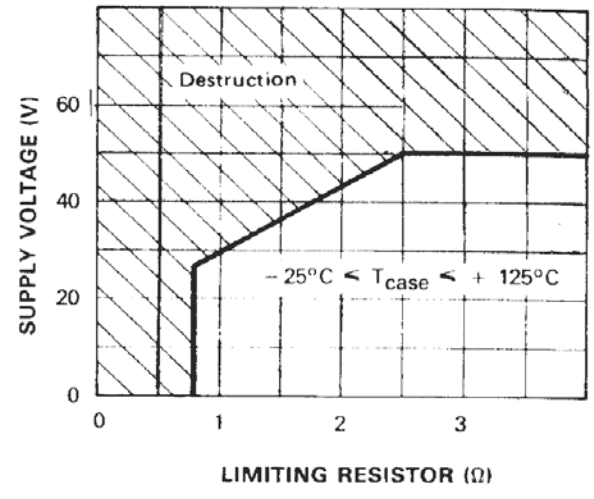


Figure 9. Output current vs output saturation voltage

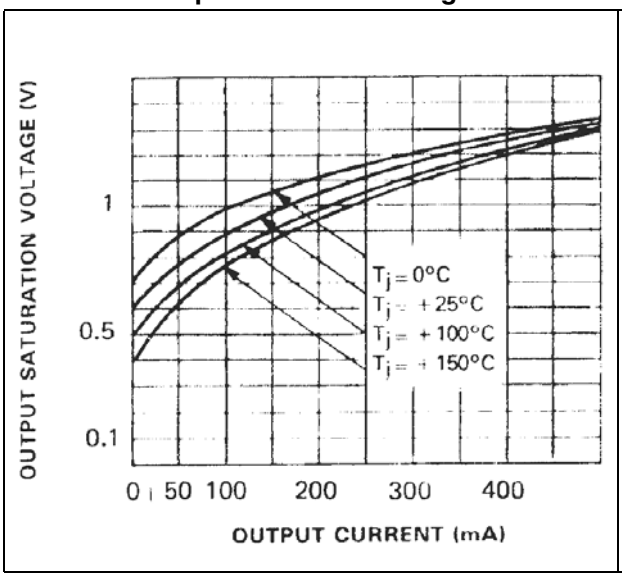


Figure 10. Supply current vs supply voltage

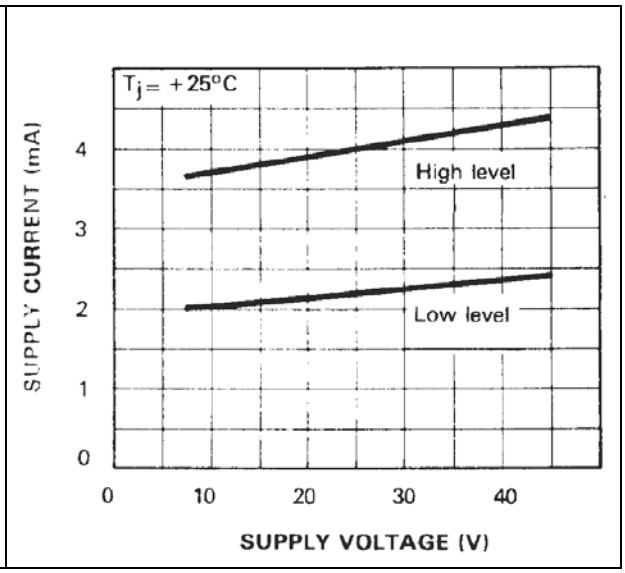


Figure 11. Supply current vs junction temperature

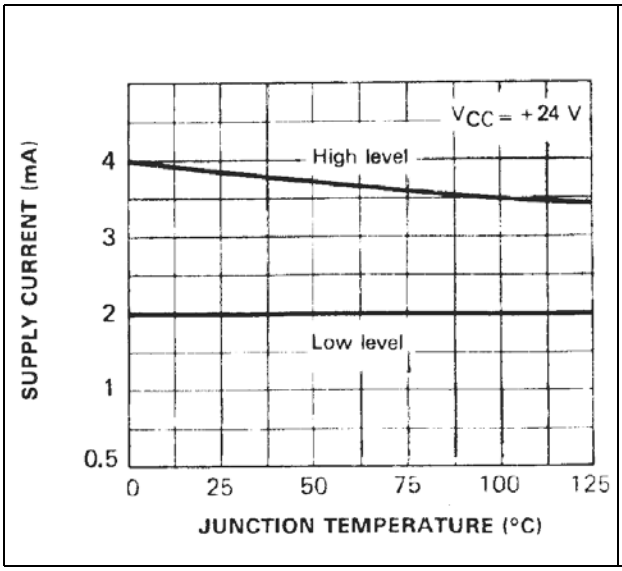


Figure 12. Safe operating area (not repetitive surge)

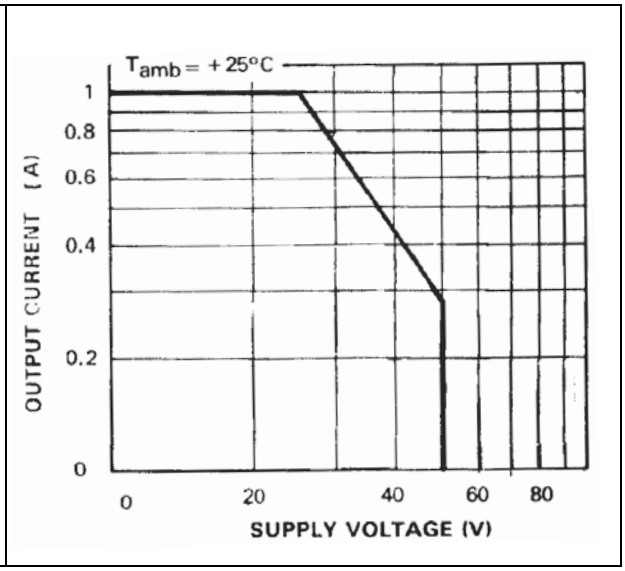
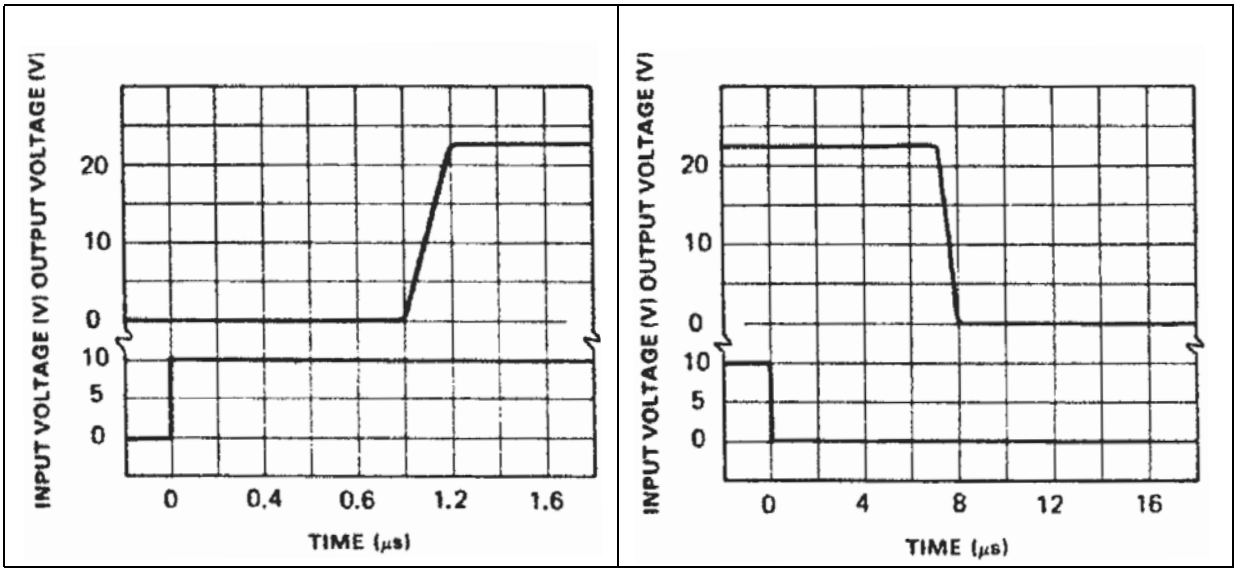


Figure 13. Response time



5 Typical applications

Figure 14. Base circuit

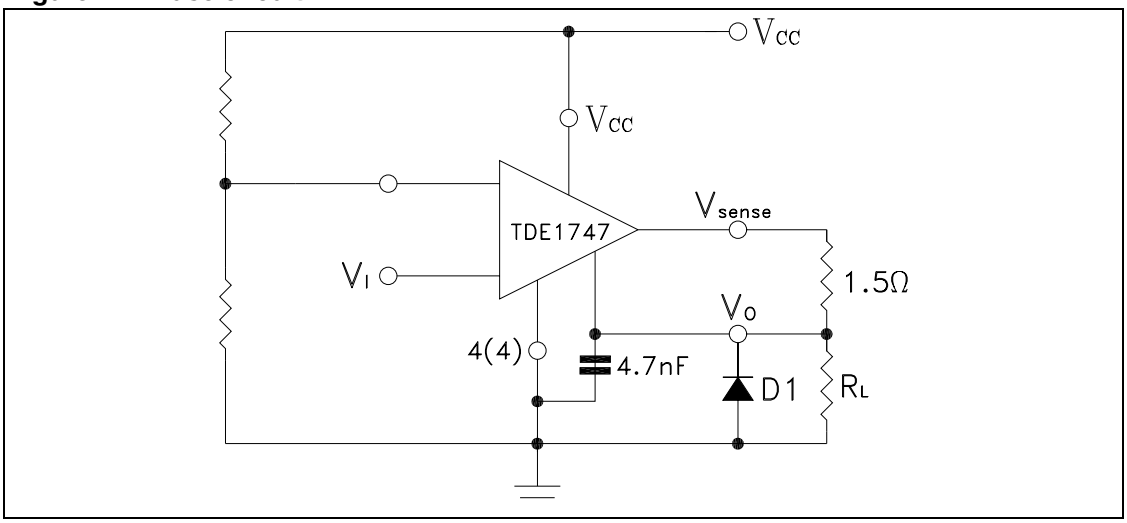


Figure 15. Output current extension (5A)

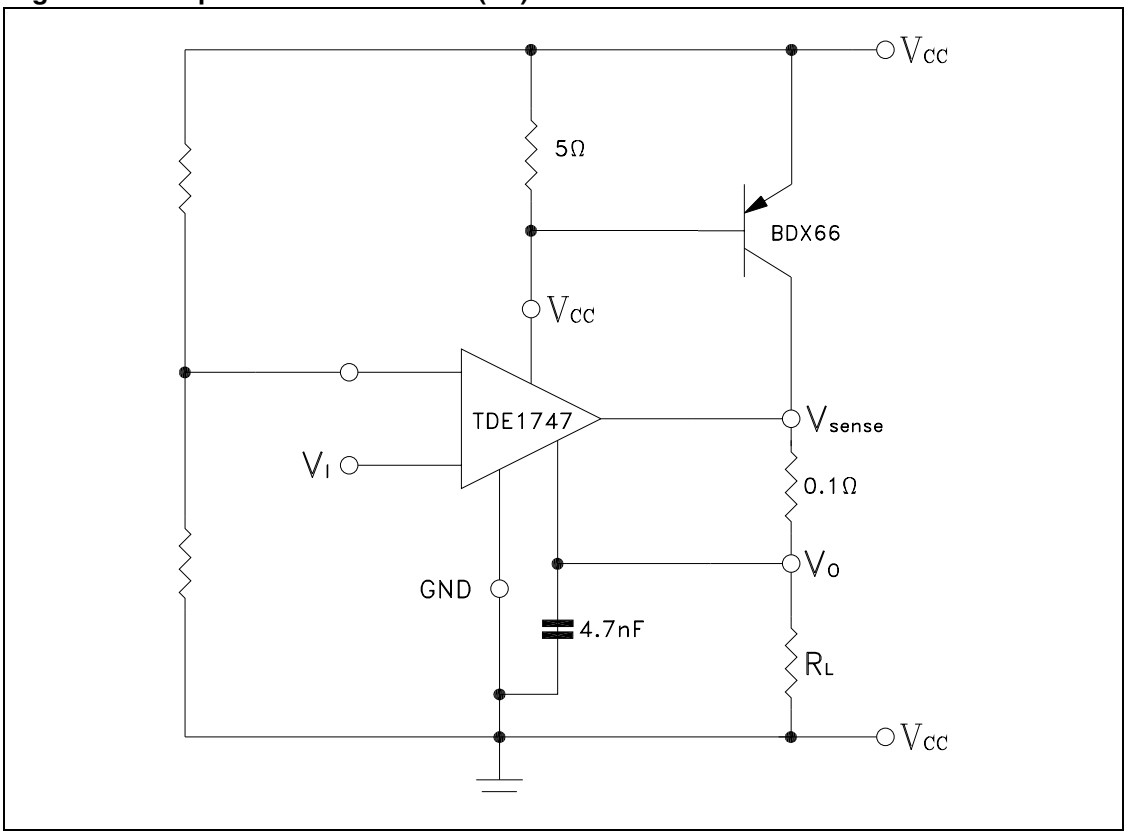
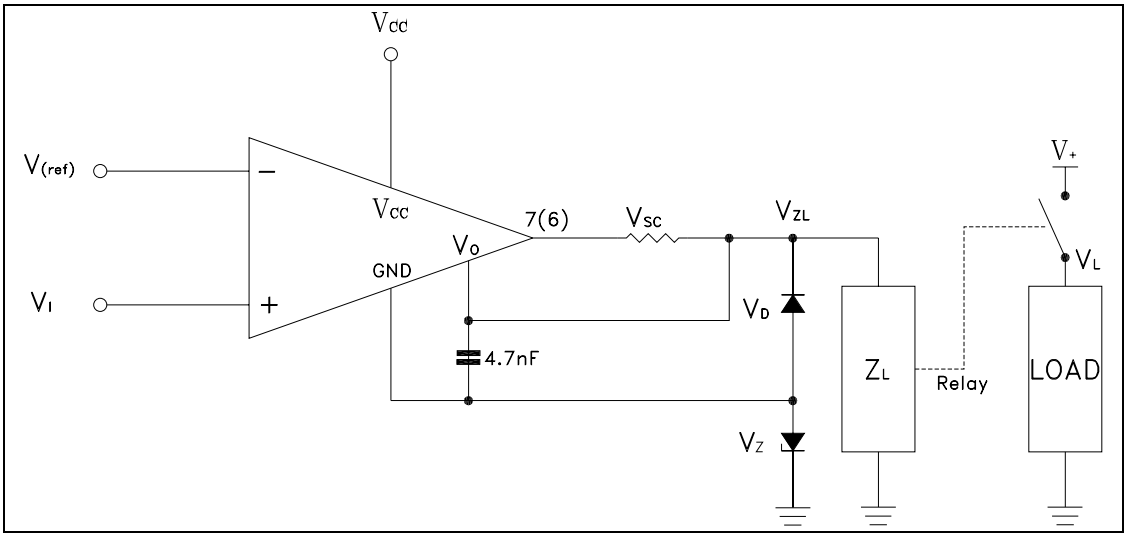


Figure 16. Driving low impedance relays (I_O = 300mA)



6 Waveforms

Figure 17. Input current vs time

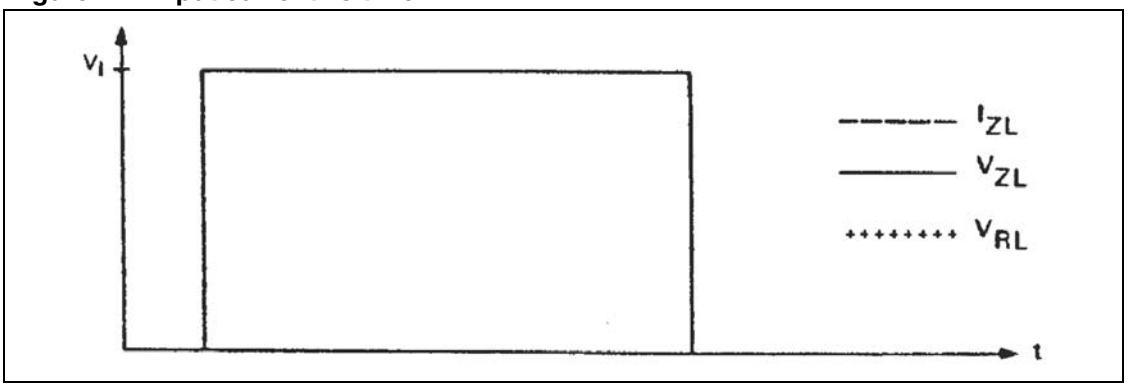


Figure 18. Response time with zener diode

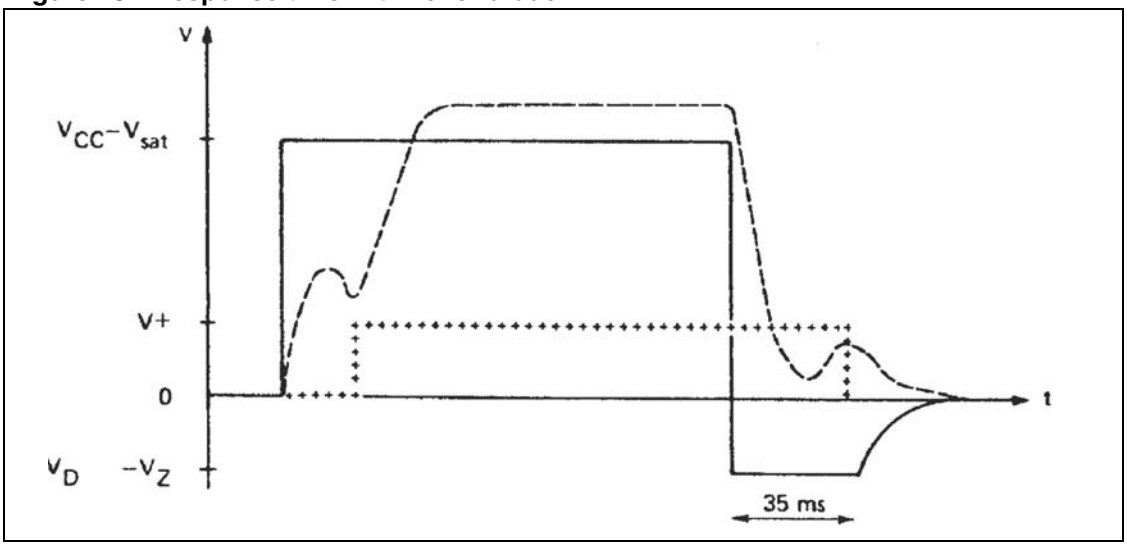
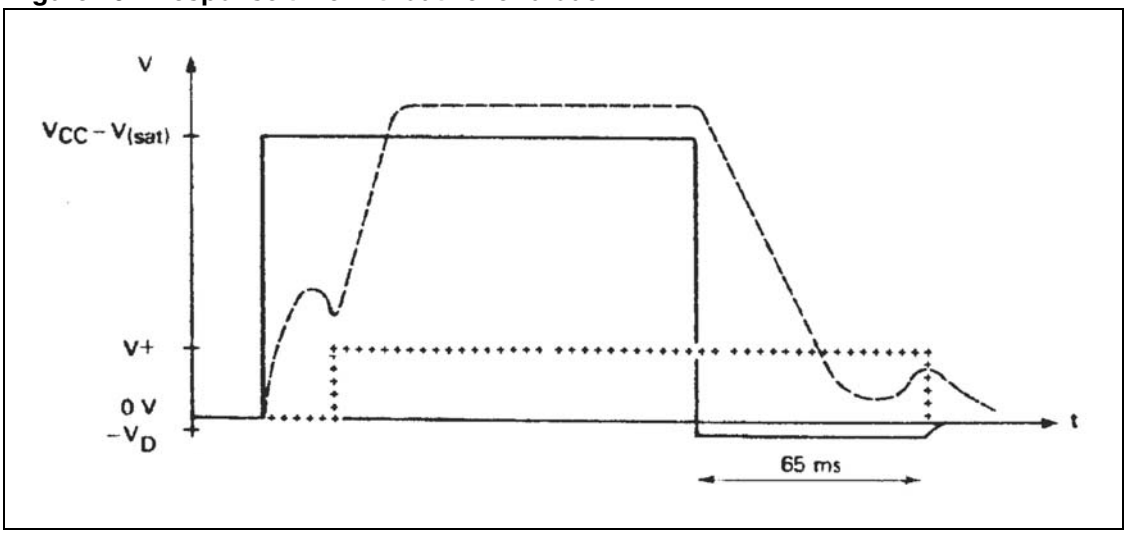


Figure 19. Response time without zener diode



7 Package 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 4. SO14 Mechanical data

Dim.	mm			Inch		
	Min	Typ	Max	Min	Typ	Max
A	1.35		1.75	0.053		0.069
A1	0.10		0.30	0.004		0.012
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.01
D(1)	8.55		8.75	0.337		0.344
E	3.80		4.0	0.150		0.157
e		1.27			0.050	
H	5.8		6.20	0.228		0.244
h	0.25		0.50	0.01		0.02
L	0.40		1.27	0.016		0.050
k	0° (min.), 8° (max.)					
ddd			0.10			0.004

1. “D” dimension does not include mold flash, protusions or gate burrs. Mold flash, protusions or gate burrs shall not exceed 0.15mm per side.

Figure 20. Package dimensions

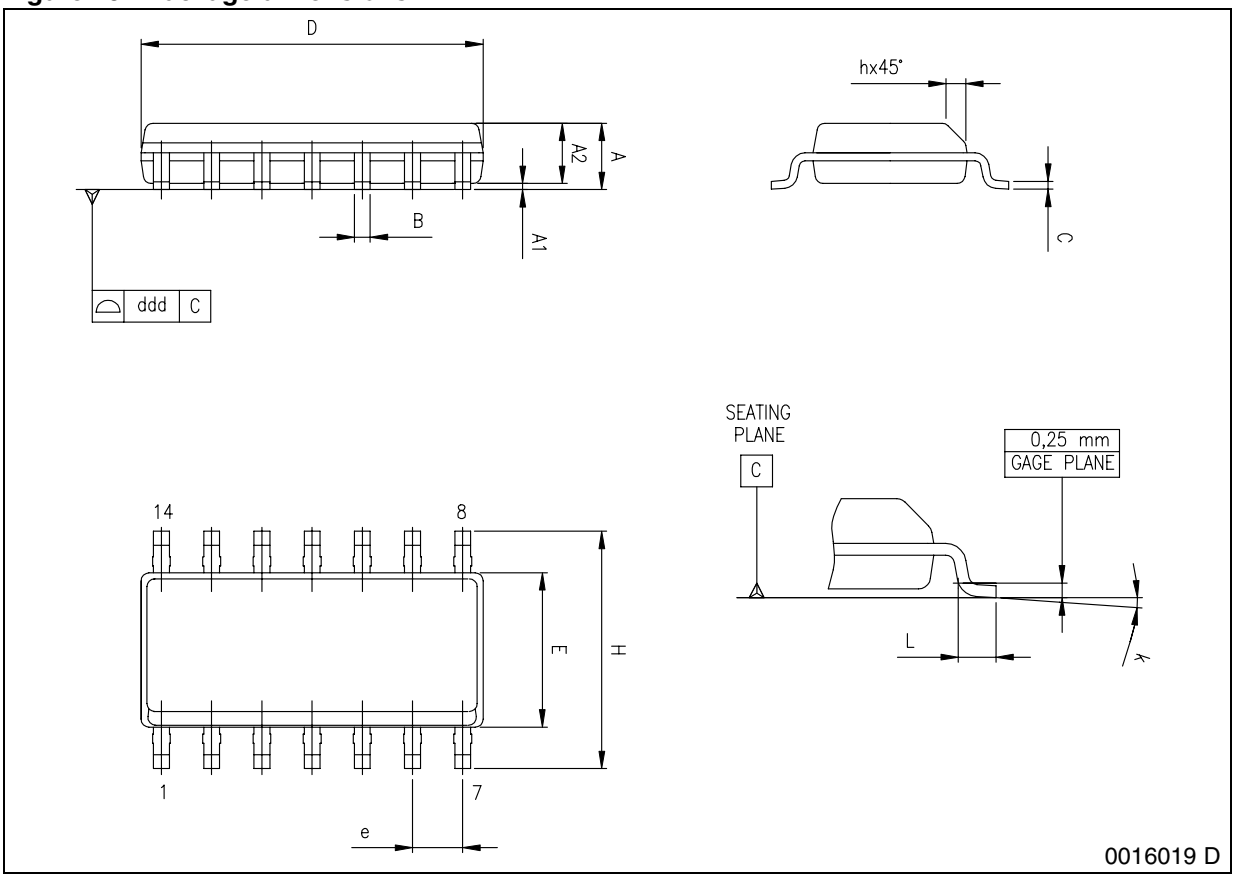
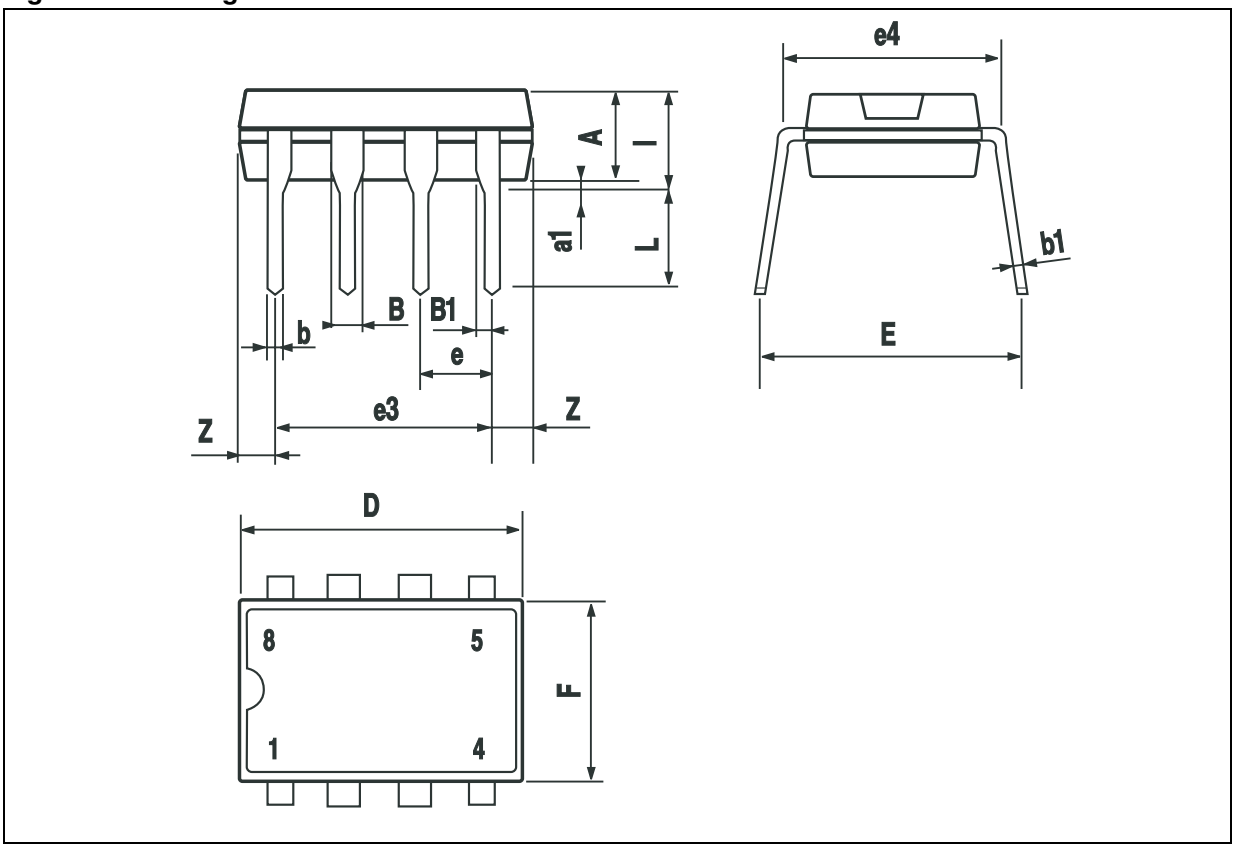


Table 5. DIP-8 Mechanical data

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 21. Package dimensions



8 Revision history

Table 6. Revision history

Date	Revision	Changes
20-Sep-2006	1	New template

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