

**INTERFACE CIRCUIT – RELAY AND LAMP – DRIVER**

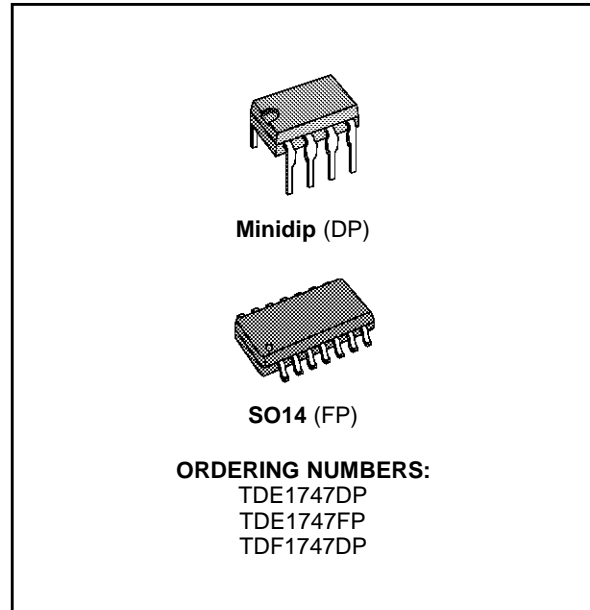
- OPEN GROUND PROTECTION
- HIGH OUTPUT CURRENT
- ADJUSTABLE SHORT-CIRCUIT PROTECTION TO GROUND
- THERMAL PROTECTION WITH HYSTERESIS TO AVOID THE INTERMEDIATE OUTPUT LEVELS
- LARGE SUPPLY VOLTAGE RANGE : + 10 V TO + 45 V
- SHORT-CIRCUIT PROTECTION TO V<sub>CC</sub>

**DESCRIPTION**

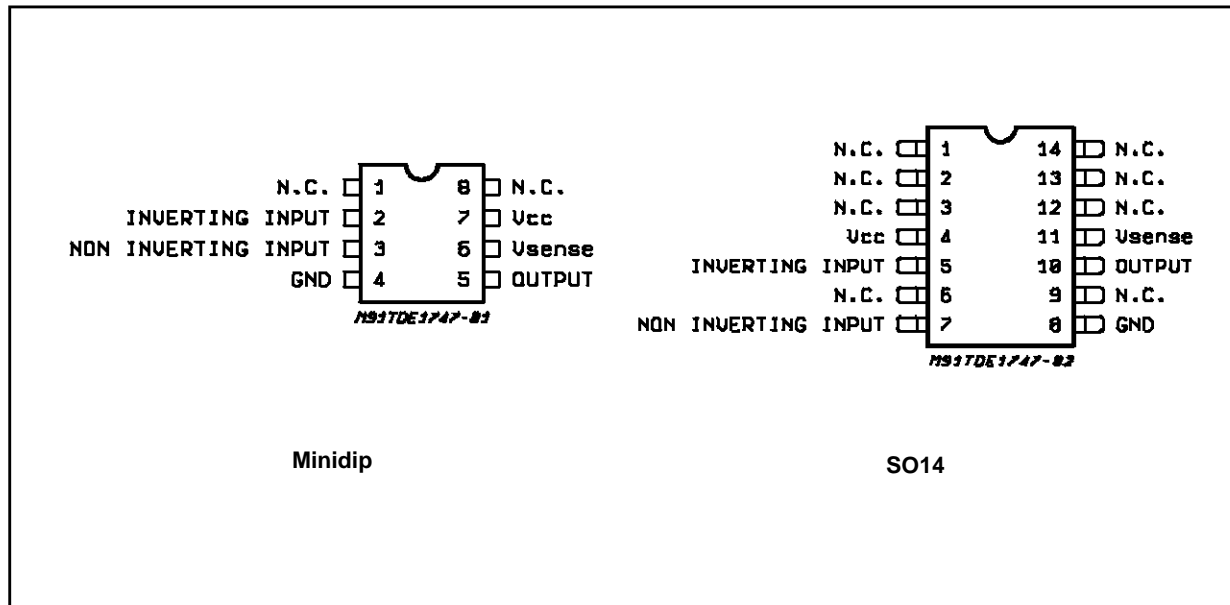
The TDE/TDF1747 is a monolithic comparator designed for high current and high voltage applications, specifically to drive lamps, relays, stepping motors.

These device is essentially blow-out proof. Current limiting is available to limit the peak output current to safe values, the adjustment only requires one external resistor. In addition, thermal shut down is provided to keep the I.C. from overheating. If internal dissipation becomes too great, the driver will shut down to prevent excessive heating. TDE1747 has an open ground protection. The output is also protected from short-circuits with the positive power supply.

**PIN CONNECTIONS** (Top view)



The device operates over a wide range of supply voltages from standard  $\pm 15$  V operational amplifier supplies down to the single + 12 V or + 24 used for industrial electronic systems.



# TDE1747 - TDF1747

## ABSOLUTE MAXIMUM RATINGS

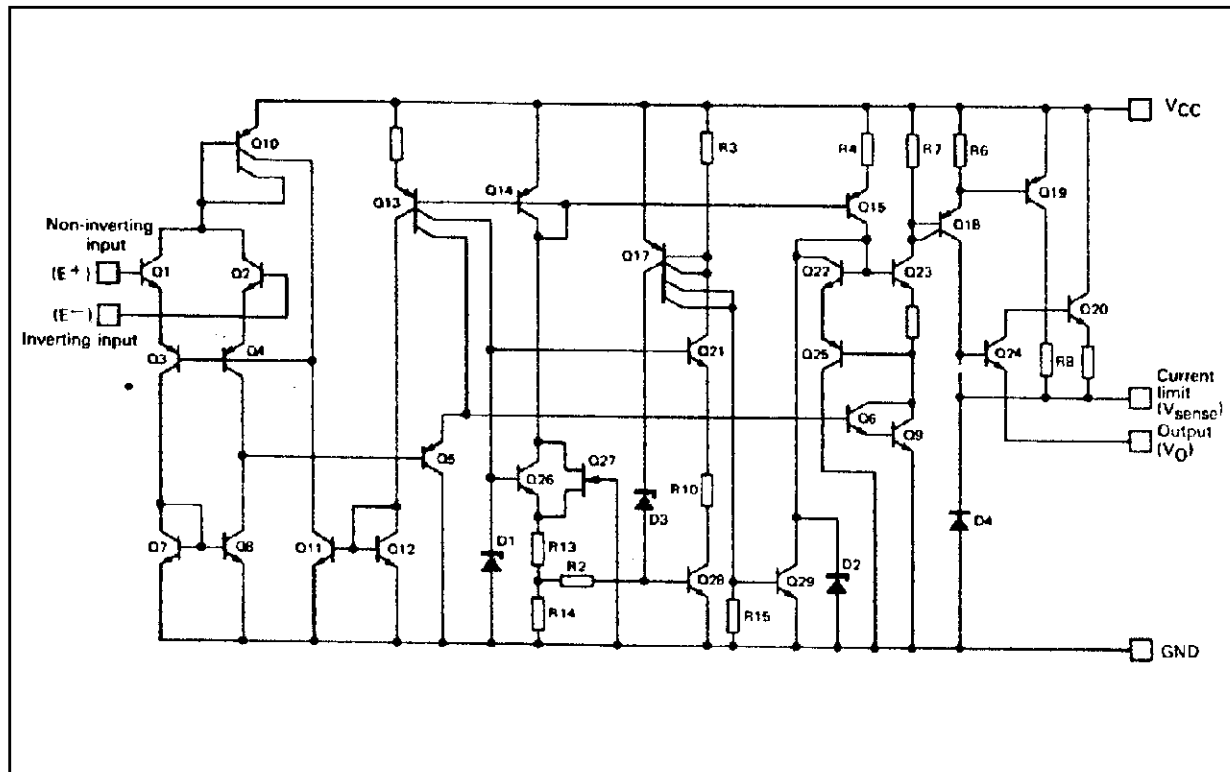
Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage	50 *	V
$V_{ID}$	Differential Input Voltage	50	V
$V_I$	Input Voltage	50	V
$I_O$	Output Current	1	A
$P_{tot}$	Power Dissipation ( $T_{amb} = +25\text{ }^{\circ}\text{C}$ )	Internally Limited	W
$T_{stg}$	Storage Temperature Range	- 65 to + 150	$^{\circ}\text{C}$
$T_{oper}$	Operating Ambient Temperature Range TDE1747 TDF1747	- 25 to + 85 - 40 to + 85	$^{\circ}\text{C}$ $^{\circ}\text{C}$

(\*) 60V,  $t_a$  10ms

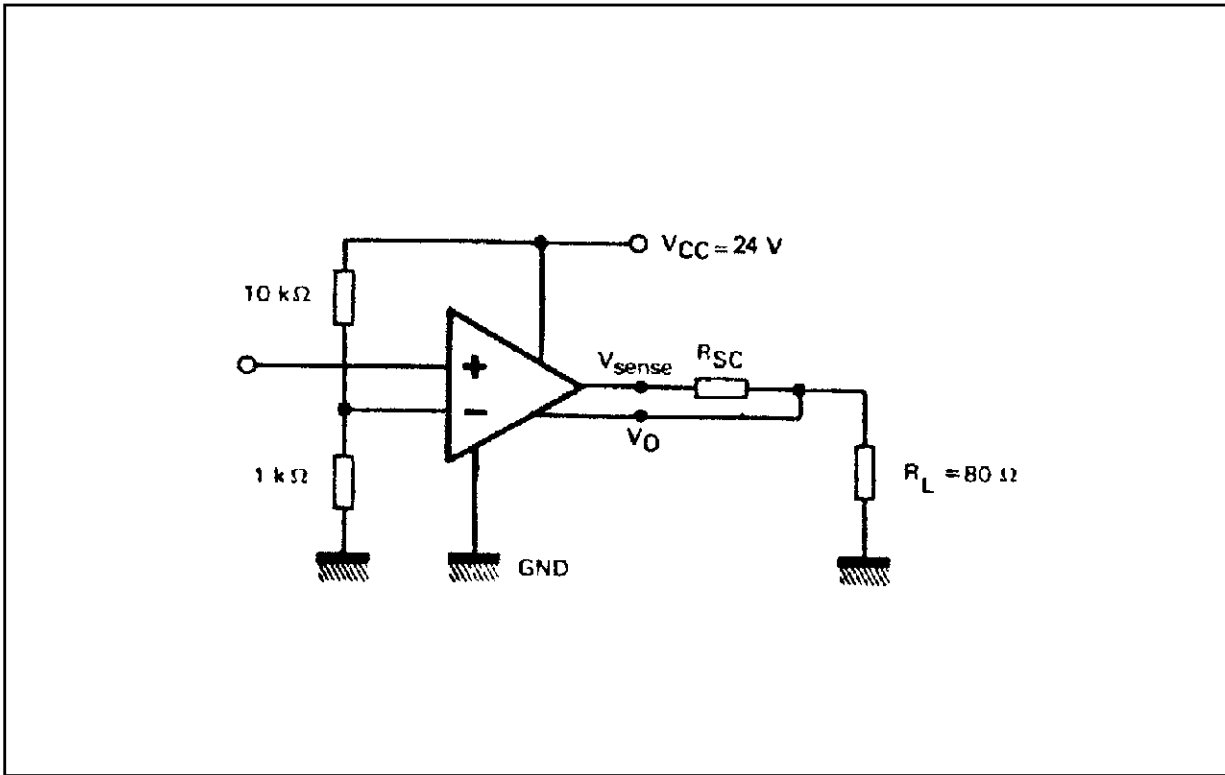
## THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Maximum Junction-case Thermal Resistance	50	$^{\circ}\text{C/W}$
$R_{th(j-a)}$	Maximum Junction-ambient Thermal Resistance	120	$^{\circ}\text{C/W}$
$R_{th}$	Junction-ceramic Substrate (case glued to substrate) SO14	90	$^{\circ}\text{C/W}$
$R_{th}$	Junction-ceramic Substrate (case glued to substrate, substrate temperature maintained constant) SO14	65	$^{\circ}\text{C/W}$

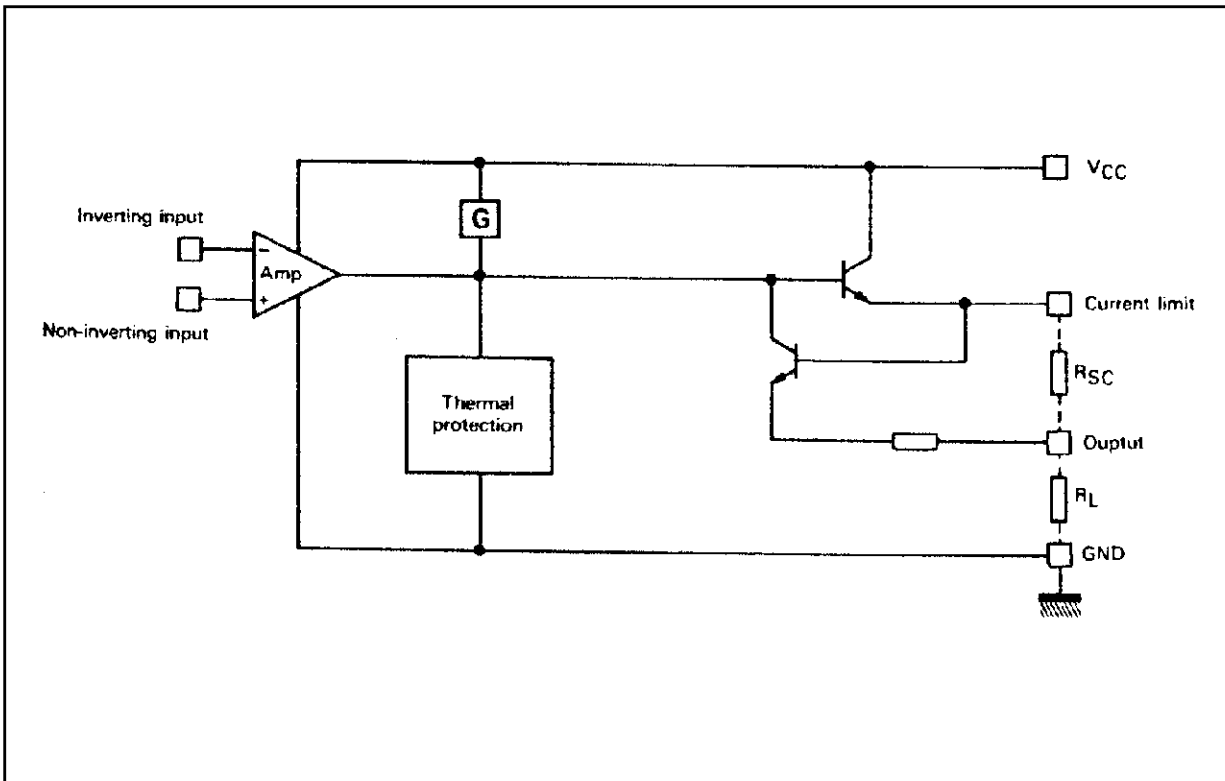
## SCHEMATIC DIAGRAM



TEST CIRCUIT



SIMPLIFIED CIRCUIT



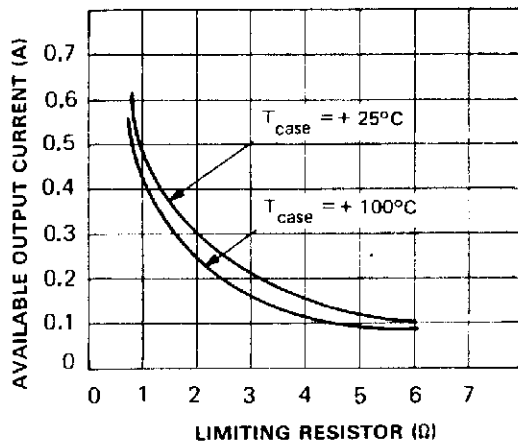
**ELECTRICAL CHARACTERISTICS**  $T_j = -25$  to  $+85$  °C,  $V_{CC} = 8$  to  $45$  V, unless otherwise specified (note 1).

Symbol	Parameter	Min.	Typ.	Max.	Unit	
$V_{IO}$	Input Offset Voltage - (note 2)	–	2	50	mV	
$I_{IB}$	Input Bias Current	–	0.1	1.5	mA	
$I_{CC}$	Supply Current ( $V_{CC} = +24$ V, $I_O = 0$ )					
	High Level	–	4	6	mA	
	Low Level	–	2	4	mA	
$V_{I(max)}$	Common-mode Input Voltage Range	2	–	$V_{CC}-2$	V	
$I_{SC}$	Short-circuit Current Limit ( $T_{amb} = +25$ °C, $V_{CC} = +24$ ) $R_{SC} = 1.5$ Ω $R_{SC} = \infty$					
		TDE1747	–	480	–	mA
			–	35	50	mA
$V_{CC}-V_O$	Output Saturation Voltage (output high) ( $R_{sc} = 0$ , $V_{I+}-V_{I-} \geq 50$ mV) $I_O = 300$ mA, $T_j = +25$ °C $T_j = +150$ °C	–	1.15	1.4	V	
		–	1.05	1.3	V	
$I_{OL}$	Low Level Output Current ( $V_O = 0$ , $V_{CC} = +24$ V) $T_j = +25$ °C	–	0.01	10	μA	

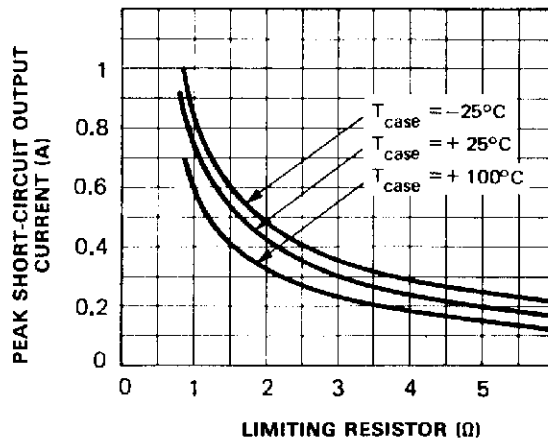
**Notes :**

- 1) For operating at high temperature, the TDE/TDF1747, must be derated based on a + 150 C maximum junction temperature and a junction-ambient thermal resistance of 120 °C/W for Minidip 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 2 V of the ground or the supply voltage.

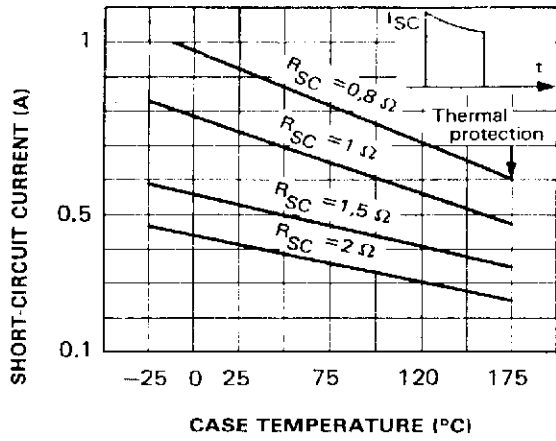
**Figure 1:** Available Output Current vs. Limiting Resistor



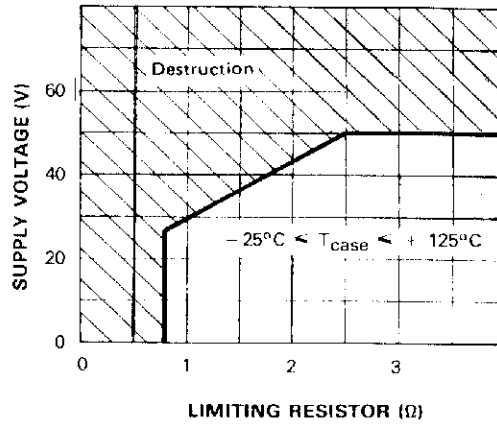
**Figure 2:** Peak Short-circuit Output Current vs. Limiting Resistor



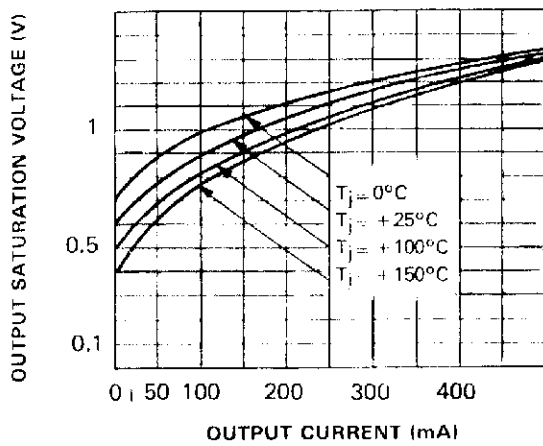
**Figure 3:** Short-circuit Current vs. Case Temperature



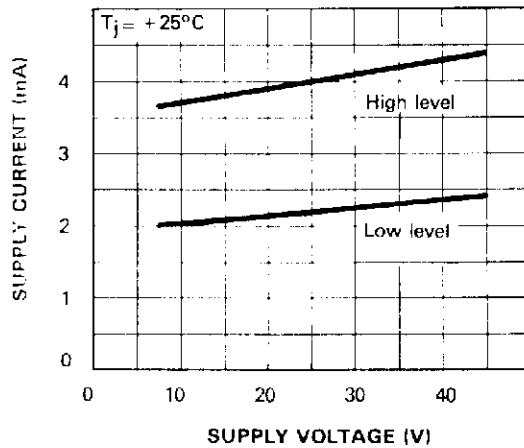
**Figure 4:** Minimum Limiting Resistor Value vs. Supply Voltage



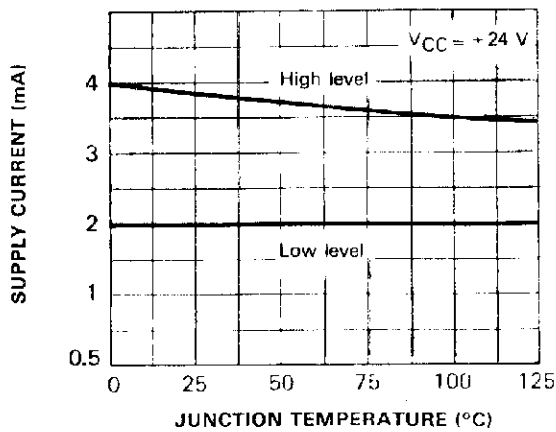
**Figure 5:** Output Current vs. Output Saturation Voltage



**Figure 6:** Supply Current vs. Supply Voltage



**Figure 7:** Supply Current vs. Junction Temperature



**Figure 8:** Safe Operating Area (non repetitive surge)

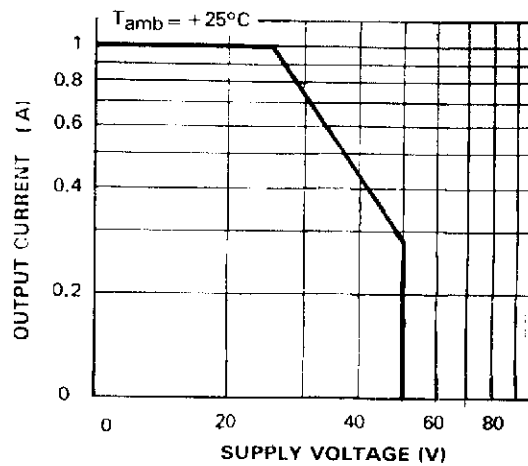
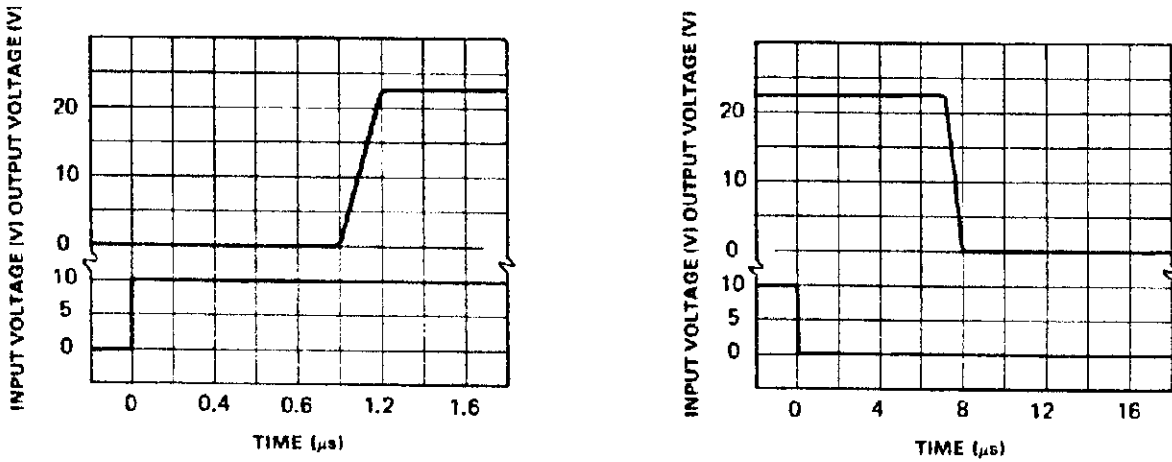


Figure 9: Response Time



TYPICAL APPLICATIONS

Figure 10: Base Circuit

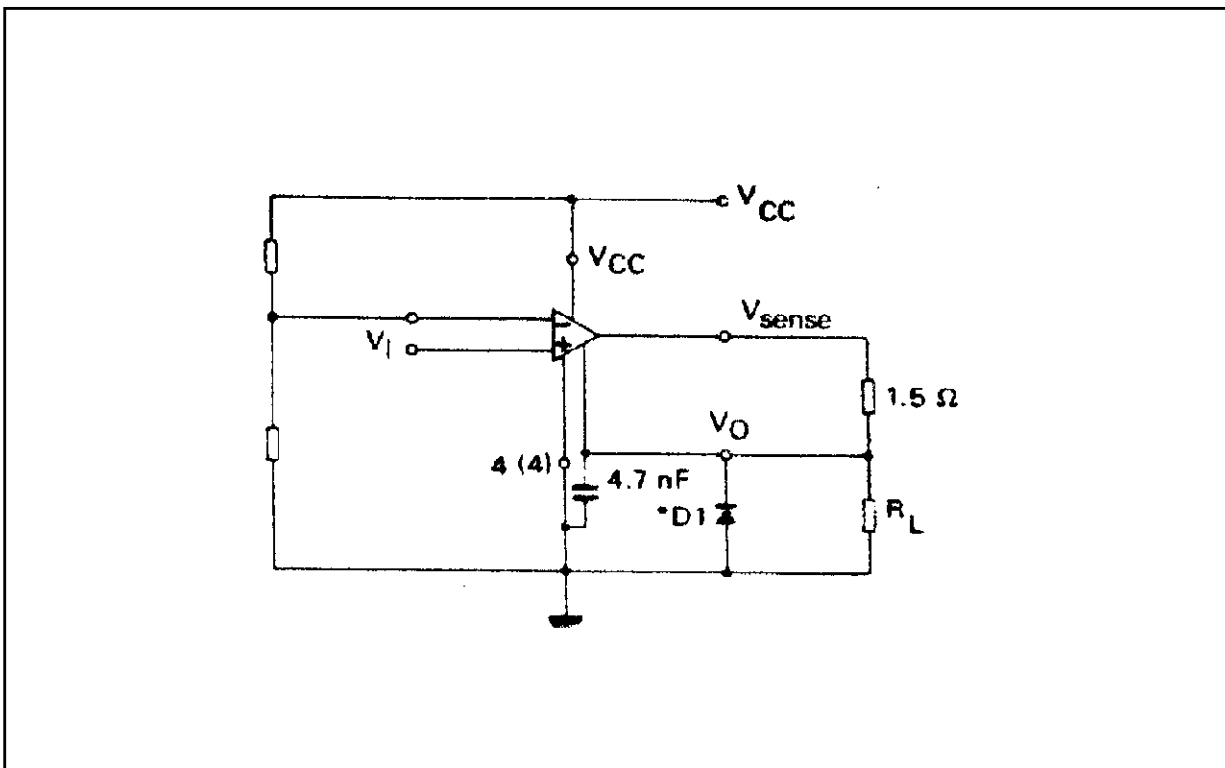


Figure 11: Output Current Extension (5A)

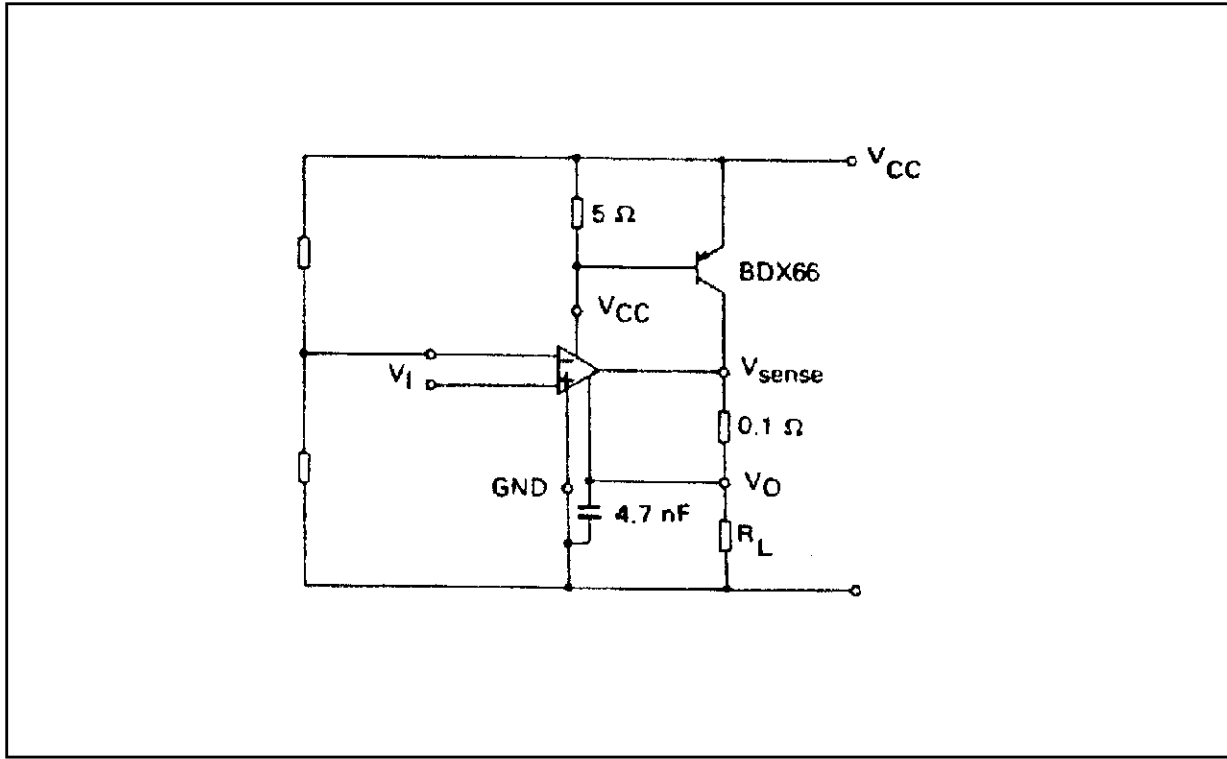
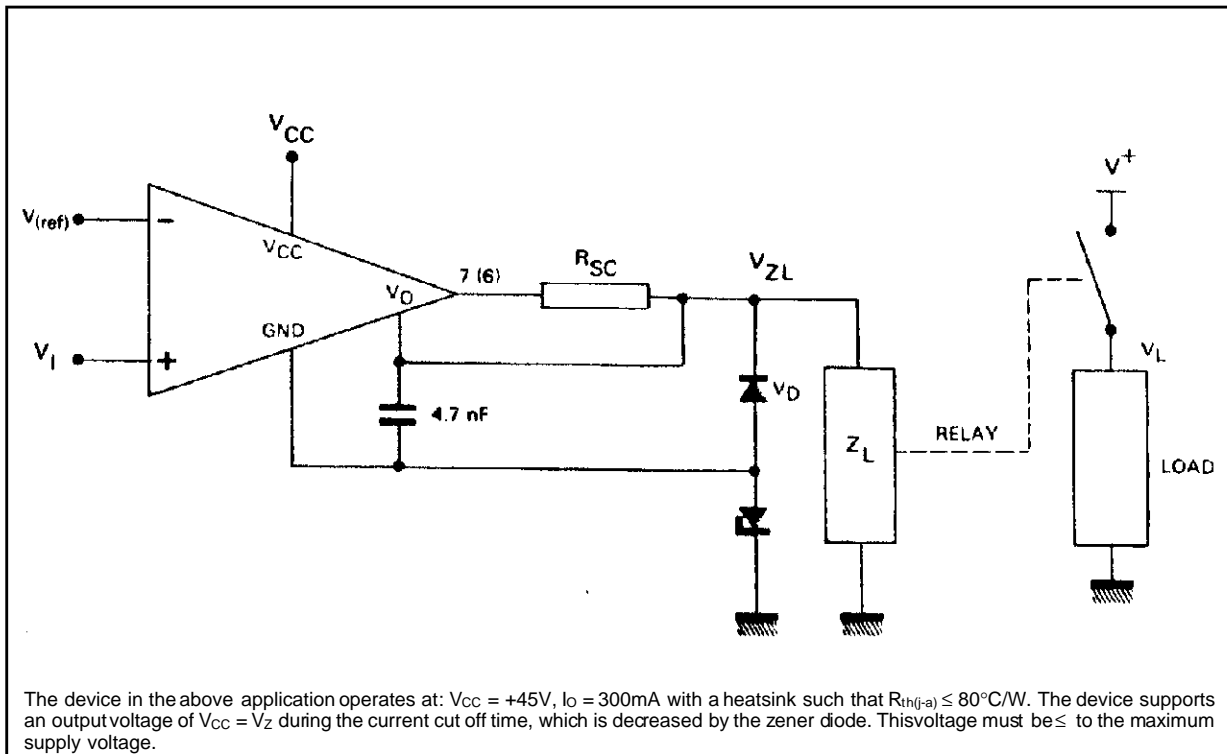
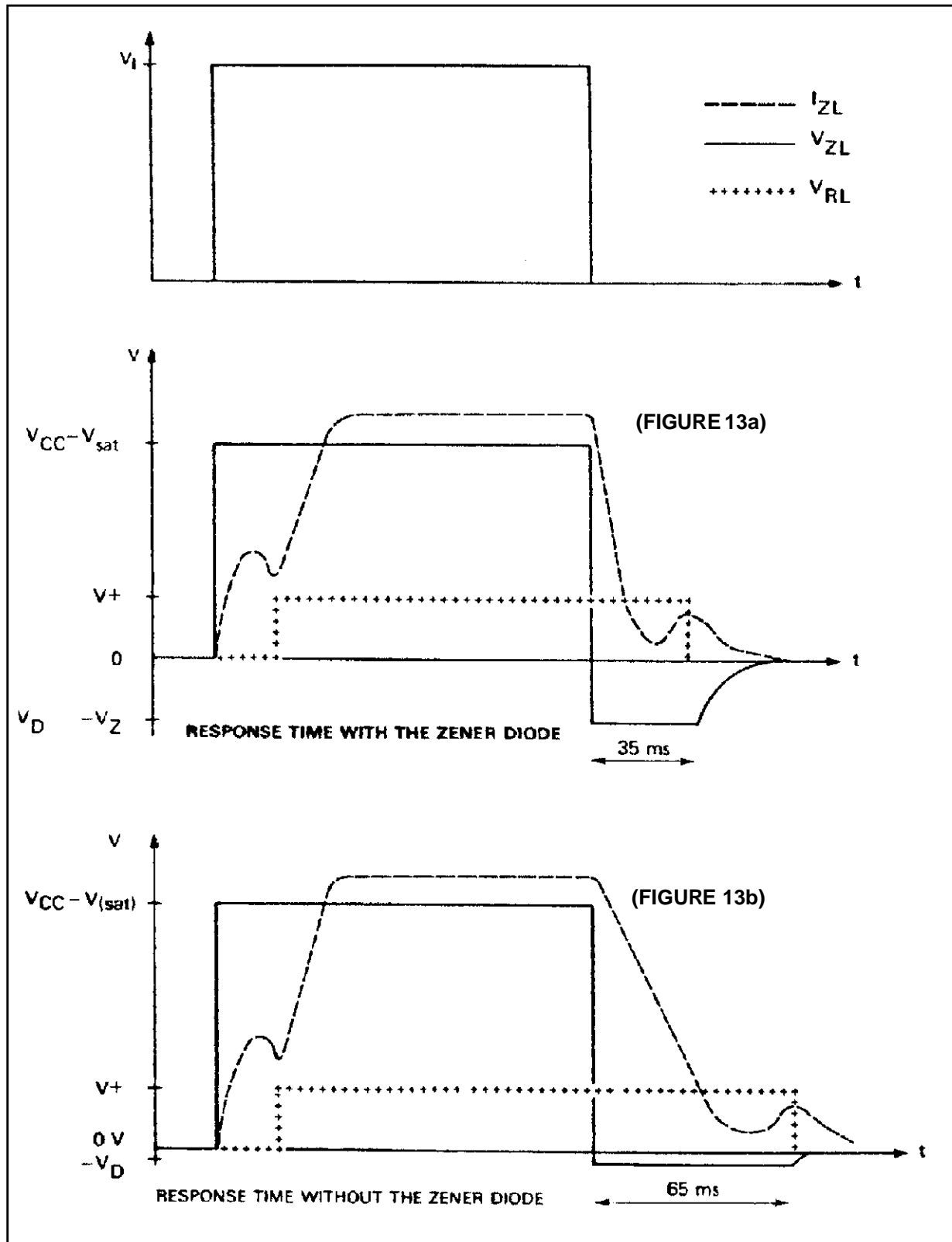


Figure 12: Driving Low Impedance Relays ( $I_o = 300\text{mA}$ )



The device in the above application operates at:  $V_{CC} = +45\text{V}$ ,  $I_o = 300\text{mA}$  with a heatsink such that  $R_{th(j-a)} \leq 80^\circ\text{C/W}$ . The device supports an output voltage of  $V_{CC} = V_Z$  during the current cut off time, which is decreased by the zener diode. This voltage must be  $\leq$  to the maximum supply voltage.

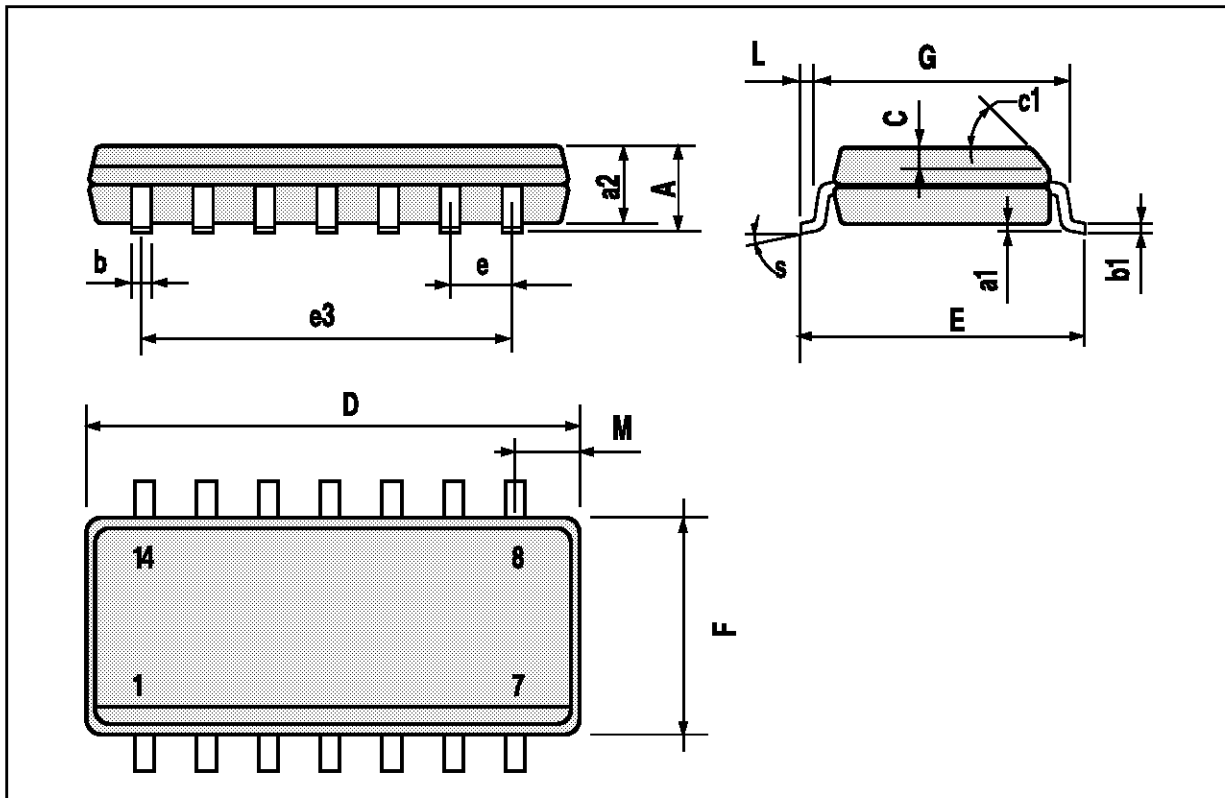
Figure 13: Waveforms





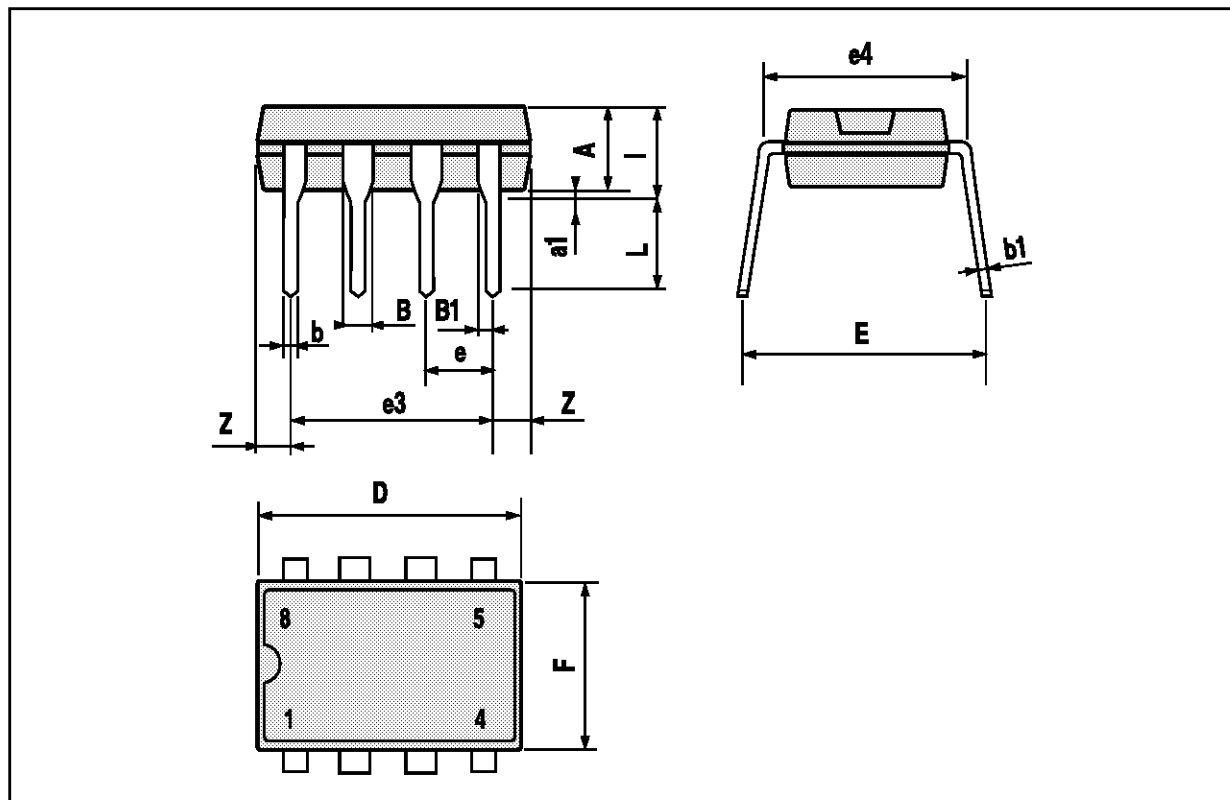
## SO14 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.069
a1	0.1		0.25	0.004		0.009
a2			1.6			0.063
b	0.35		0.46	0.014		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.020	
c1	45 (typ.)					
D	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F	3.8		4.0	0.15		0.157
L	0.4		1.27	0.016		0.050
M			0.68			0.027
S	8 (max.)					



MINIDIP PACKAGE 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



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