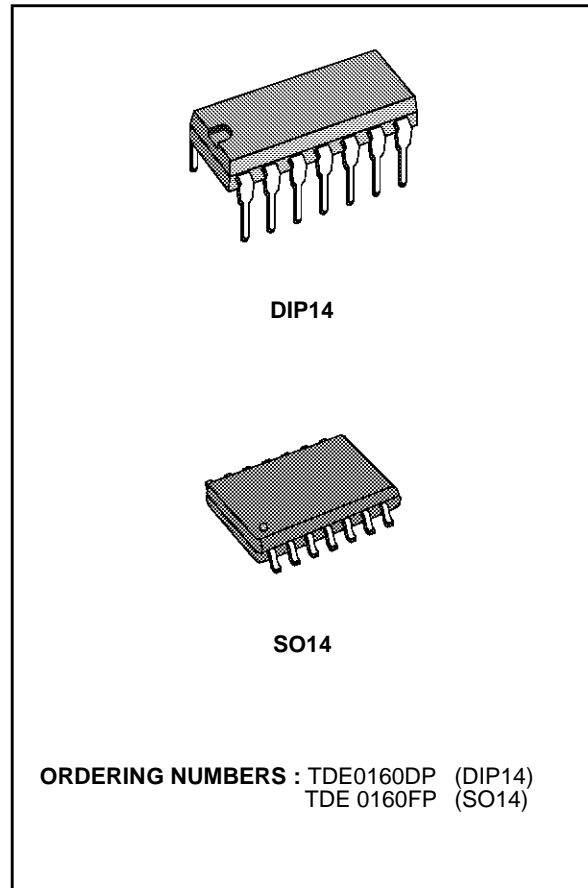


PROXIMITY DETECTOR

- SUPPLY VOLTAGE : +4 TO +36V
- SUPPLY CURRENT : < 1.2mA
- OUTPUT TRANSISTORS : I = 20mA;
V_{CE (sat)} ≤ 1100mV
- OSCILLATOR FREQUENCY : < 1MHz
- LOSS RESISTANCE : 5 TO 50kΩ.

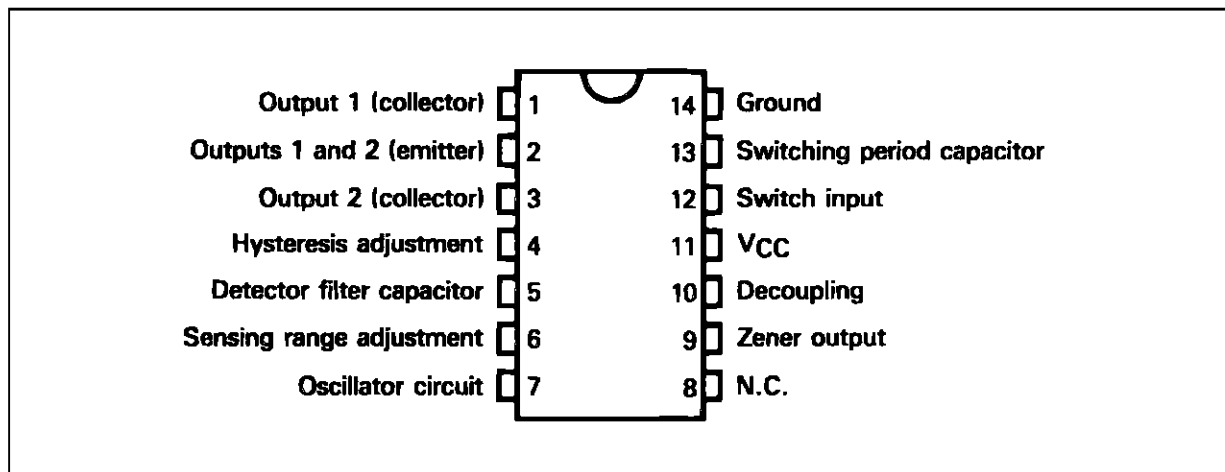


DESCRIPTION

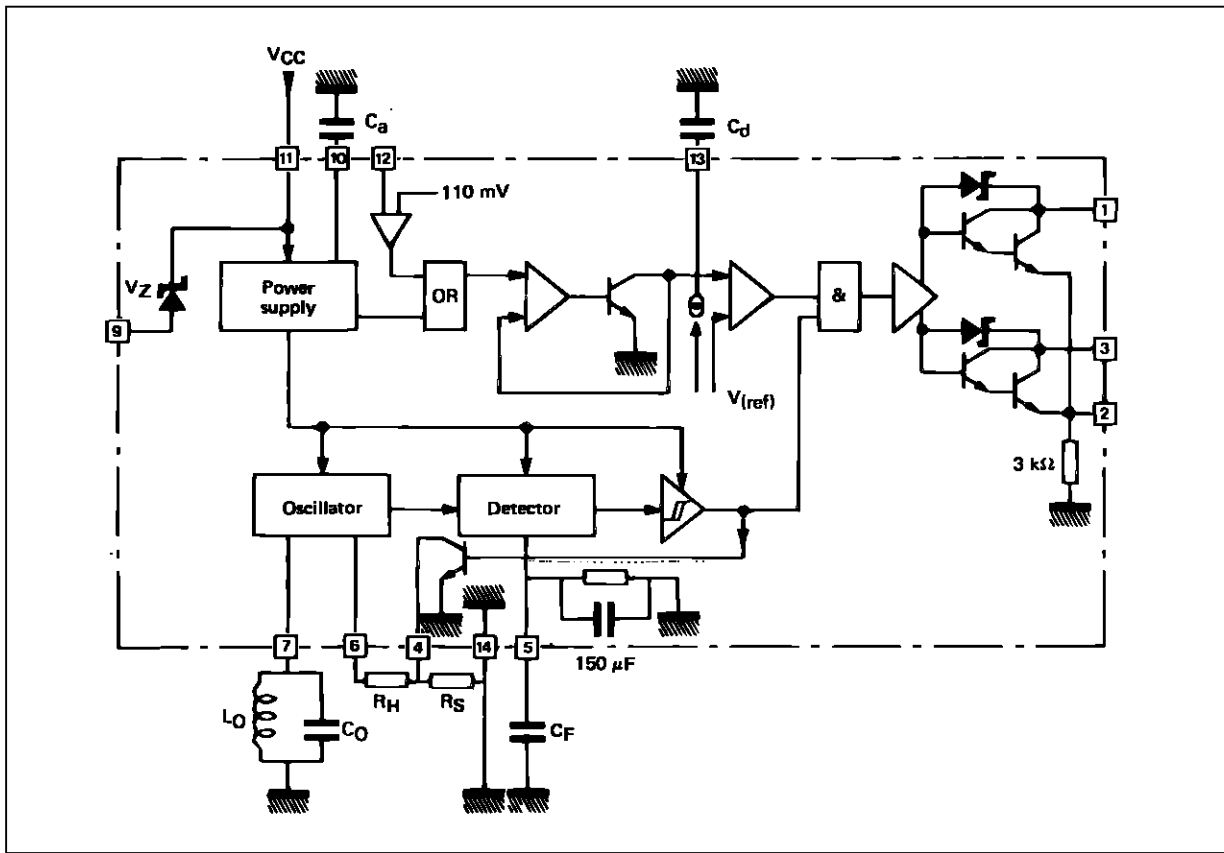
The TDE0160 is designed to detect metal bodies by the effect of Eddy currents on the HF losses of a coil. It has two complementary open collector outputs with peak limiting. Hysteresis is adjustable, and an electronic switching circuit is incorporated for disabling both outputs.

An internal zener diode maintains the supply voltage to the circuit in "dipole" operation.

PIN CONNECTION (top view)



SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{cc}	Supply Voltage	36	V
V _{O*}	Output Voltage*	36	V
I _O (I ₁ -I ₃)	Output Current (I ₁ -I ₃)	40	mA
I _Z	Zener Current	40	mA
T _J	Junction Temperature	+ 150	°C
T _{oper}	Ambient Temperature Range	- 25 to + 85	°C
T _{stg}	Storage Temperature Range	- 65 to + 150	°C

* Internal peak limiting to protect against transient voltage surges.

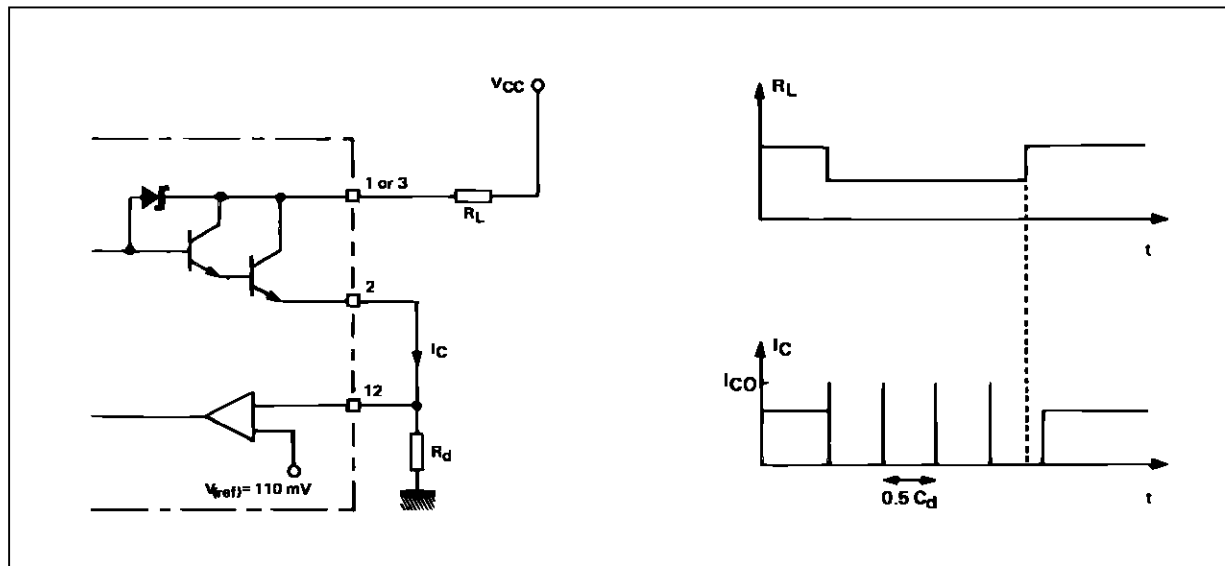
ELECTRICAL CHARACTERISTICS

$T_{amb} = +25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage Pin 11	4		36	V
V_Z	Zener Voltage ($I_Z = 20\text{mA}$) Pins 9-11	3		4	V
I_{CC}	Supply Current Pin 11			1.2	mA
–	Limiting ($I = 0.1\text{mA}$) Pin 1 or 3		42		V
–	Output Transistor Saturation Voltage (I_1 or $I_3 = +20\text{mA}$) Pin 1 or 3		0.9	1.1	V
–	Output Transistor Leakage Current ($V = +30\text{V}$) Pin 1 or 3			2	μA
–	Switching Threshold Pin 12	90	110	130	mV
R_n	Negative Resistance* ($5\text{k}\Omega < R_H < 50\text{k}\Omega$, $f = 100\text{kHz}$, $R_S = 0$)		$R_n = R_H$		
–	Inherent Hysteresis ($R_2 = 0$)		1	2	%
–	Programmed Hysteresis ($H < 15\%$)		$\frac{R_S}{R_S + R_H}$		%
f_{osc}	Oscillation Frequency			1	MHz
–	Switching Frequency (with matched oscillator circuit)		750		Hz
–	Switching Time-delay		$0.5 C_d$ (μF)		s
–	Switching Response Time ($C_d = 10\text{nF}$; $V_{CC} = +20\text{V}$)		10		μs

* See characteristic curves

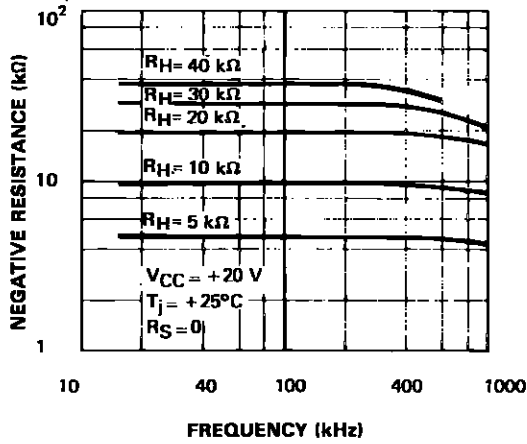
SWITCHING OPERATION



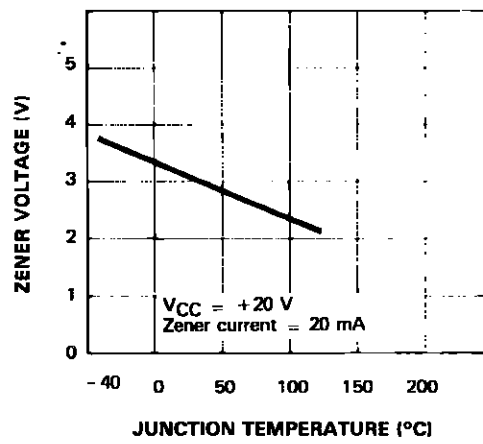
If I_c exceeds I_{CO} , where $I_{CO} = \frac{V_{(ref)}}{R_d}$ the switch cuts off the output transistors and tests the value of current I_c , with time constant $0.5 C_d$.

On power up the internal start system cuts off the output transistors until V_{CC} reaches a value permitting normal operation of the circuit.

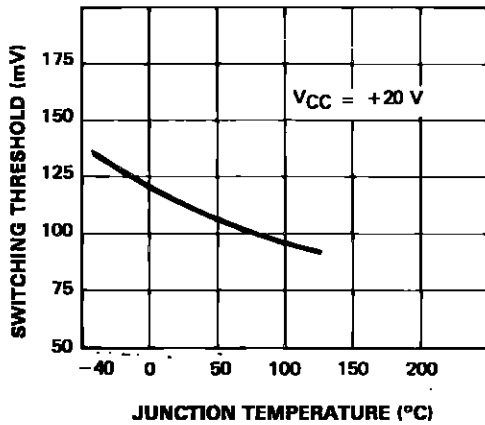
**NEGATIVE RESISTANCE
vs
FREQUENCY**



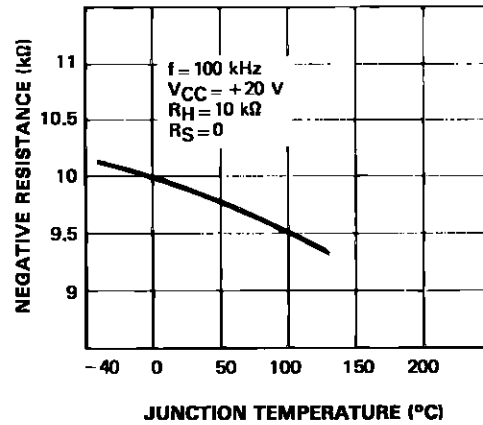
**ZENER VOLTAGE
vs
JUNCTION TEMPERATURE**



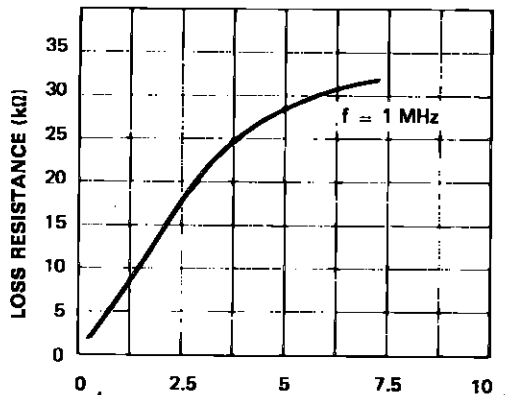
**SWITCHING THRESHOLD
vs
JUNCTION TEMPERATURE**



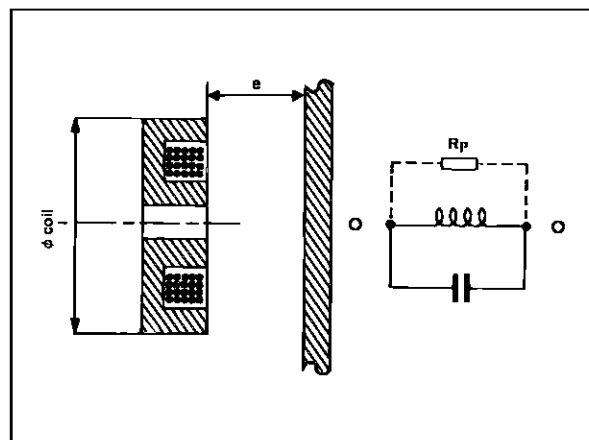
**NEGATIVE RESISTANCE
vs
JUNCTION TEMPERATURE**



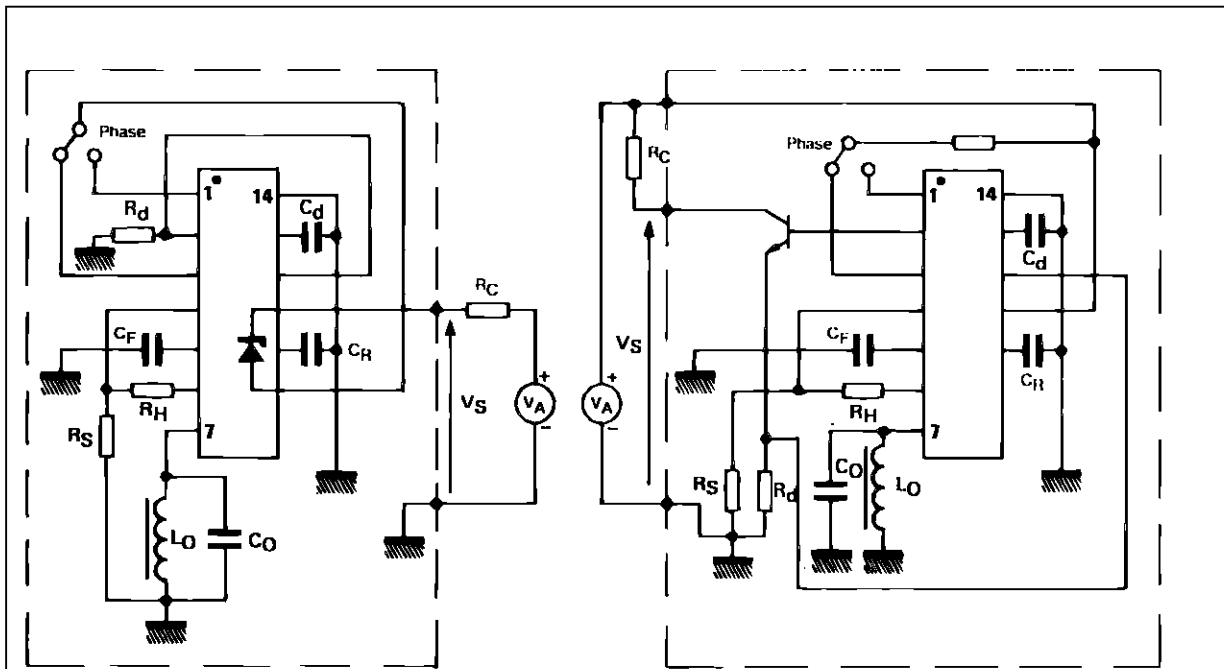
**LOSS RESISTANCE
vs
DETECTION RANGE (mm)**



MILD STEEL

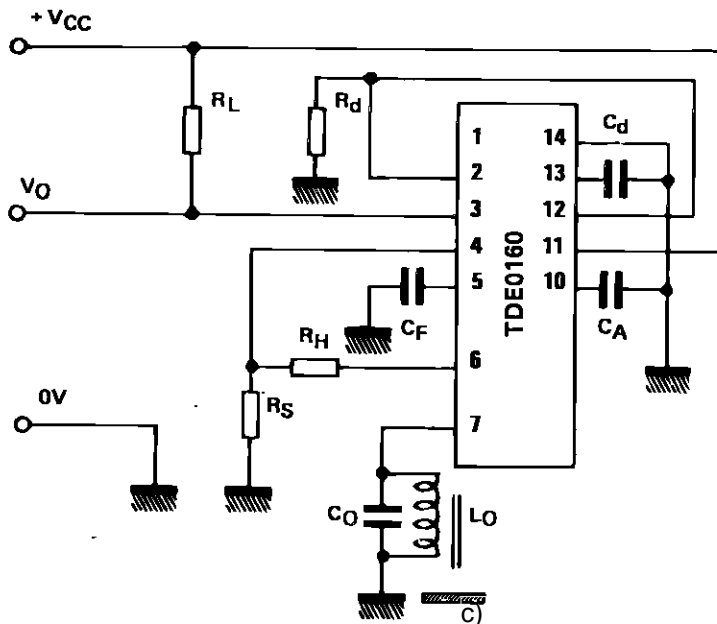


TYPICAL APPLICATION DIAGRAMS



a)

b)



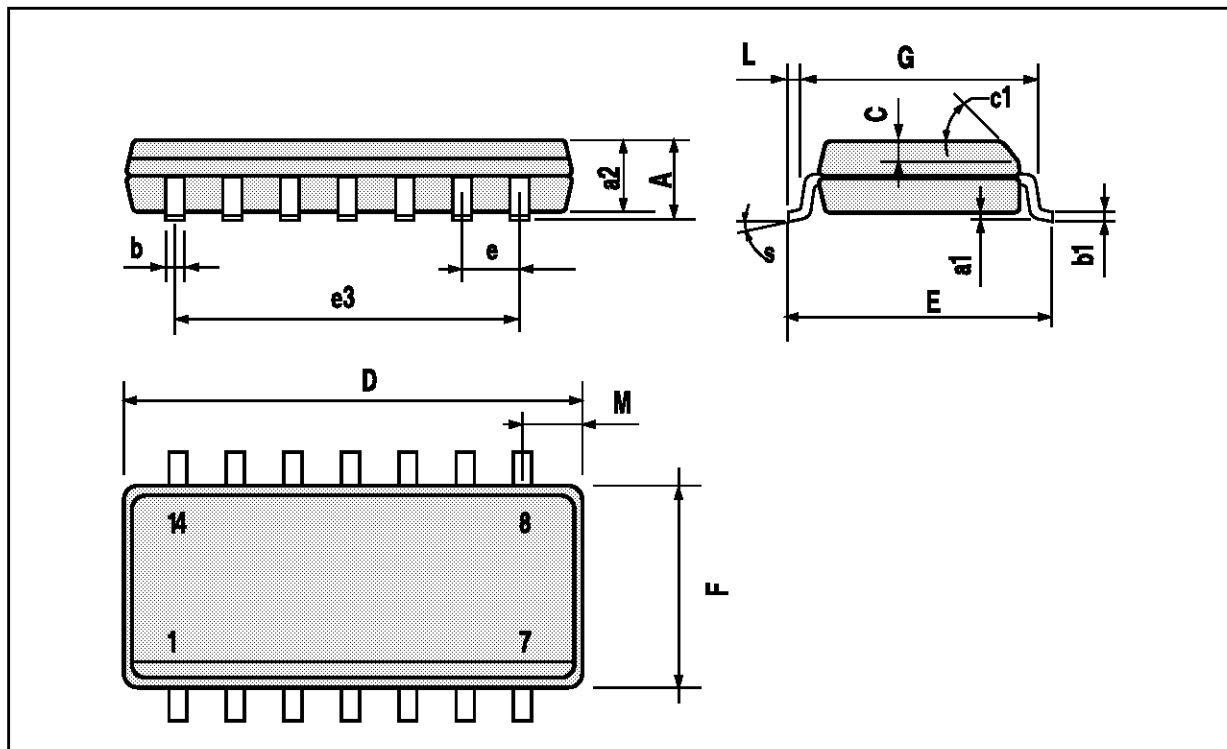
- C_a : 10nF
- C_f : 1nF
- C_d : 10nF
- C_o : 390pF
- L_o : 65 μ H to 1MHz
- R_d : 10k Ω
- R_H : 15k Ω
- R_S : 3k Ω
- R_L : 2.5k Ω

V_{CC} : 20V
 $f_o \approx 1$ MHz
 $e_{mean} = 2.5$ mm

Φ coil : 14mm
 Core COFELEC 432FP
 Turns : 47
 Stranded wire : 15 x 5/100

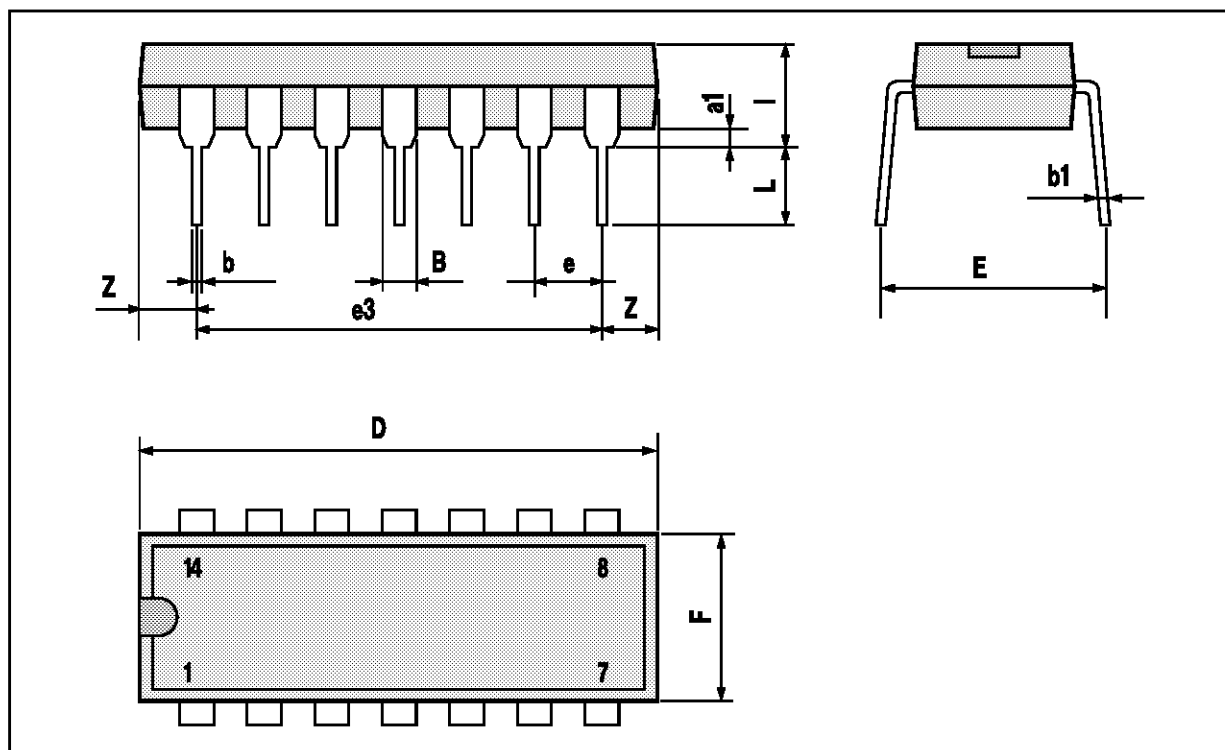
SO14 PACKAGE MECHANICAL DATA

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.)					



DIP14 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	1.39		1.65	0.055		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		15.24			0.600	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100



Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1994 SGS-THOMSON Microelectronics - All Rights Reserved

SGS-THOMSON Microelectronics GROUP OF COMPANIES

Australia - Brazil - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands - Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A.