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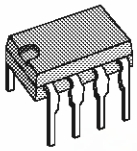
SGS-THOMSON MICROELECTRONICS

TDA0161

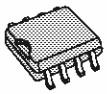
PROXIMITY DETECTORS

- OUTPUT CURRENT : 10mA
- OSCILLATOR FREQUENCY : 10 MHz
- SUPPLY VOLTAGE : + 4 TO + 35 V



Minidip

ORDERING NUMBER : TDA0161DP



SO8

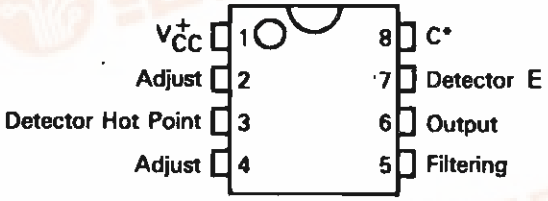
ORDERING NUMBER : TDA0161FP

DESCRIPTION

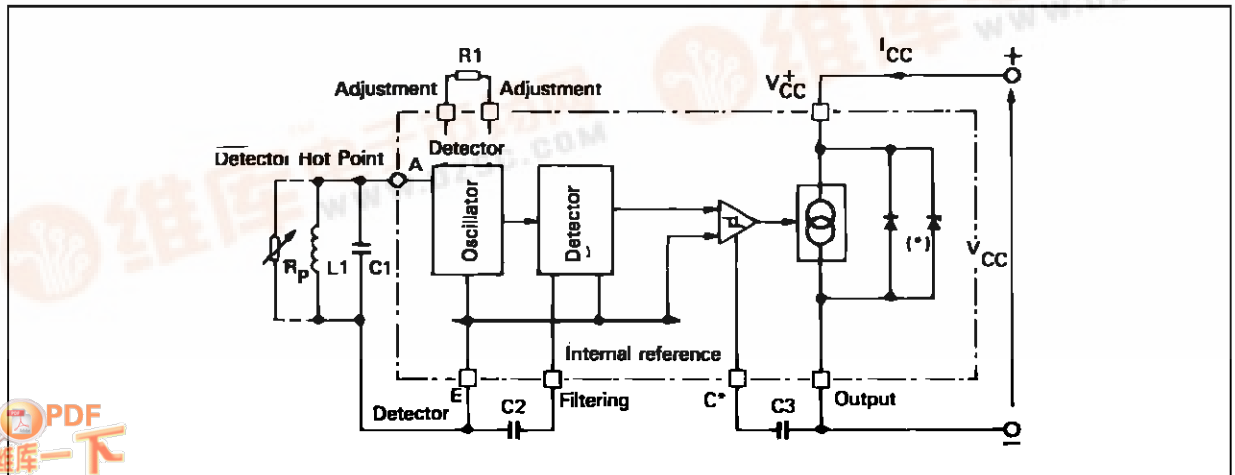
These monolithic integrated circuits are designed for metallic body detection by detecting the variations in high frequency Eddy current losses. With an external tuned circuit they act as oscillators. Output signal level is altered by an approaching metallic object.

Output signal is determined by supply current changes. Independent of supply voltage, this current is high or low according to the presence or the absence of a close metallic object.

PIN CONNECTION (top view)



SCHEMATIC DIAGRAM



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ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	35	V
T_j	Junction Temperature	+150	^oC
T_{stg}	Storage Temperature Range	–55 to +150	^oC

ELECTRICAL CHARACTERISTICS

TDA0161DP $-40^oC < T_{amb} < +100^oC$
TDA0161FP $-40^oC < T_{amb} < +100^oC$
Ptot < 150mW, unless otherwise specified

Symbol	Parameter		Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage		4		35	V
	Reverse Voltage Limitation (I_{CC} = -100 mA)	TDA0161		1		V
I_{CC}	Supply Current, Close Target (T_{amb} = +25°C) +4V < V_{CC} < +35V	TDA0161	8	10	12	mA
I_{CC}	Supply Current, Remote Target +4V < V_{CC} < +35V	TDA0161			1	mA
	Supply Current Transition Time C3 = 0 C3 ≠ 0			 1 (100 x C3 (nF))		µs
f_{osc}	Oscillator Tuning Frequency				10	MHz
f_O	Output Frequency (C3 = 0)		0		10	kHz
ΔI_{CC}	Output Current Ripple - C3 = 0, C2 (pF) > 150/f_{osc} (MHz)				20	µA
R_n	Negative Resistance on Terminals A and E 4kΩ < R1 < 50kΩ, f_{osc}< 3 MHz		0.9 R1	R1	1.1 R1	
H_{yst}	Hysteresis at Detection Point C2 (Pf) > 150/f_{osc} (MHz)		0.5		5	%

* If the circuit is used at a frequency higher than 3MHz, it is recommended to connect a capacitor of 100pF between terminals E and D.

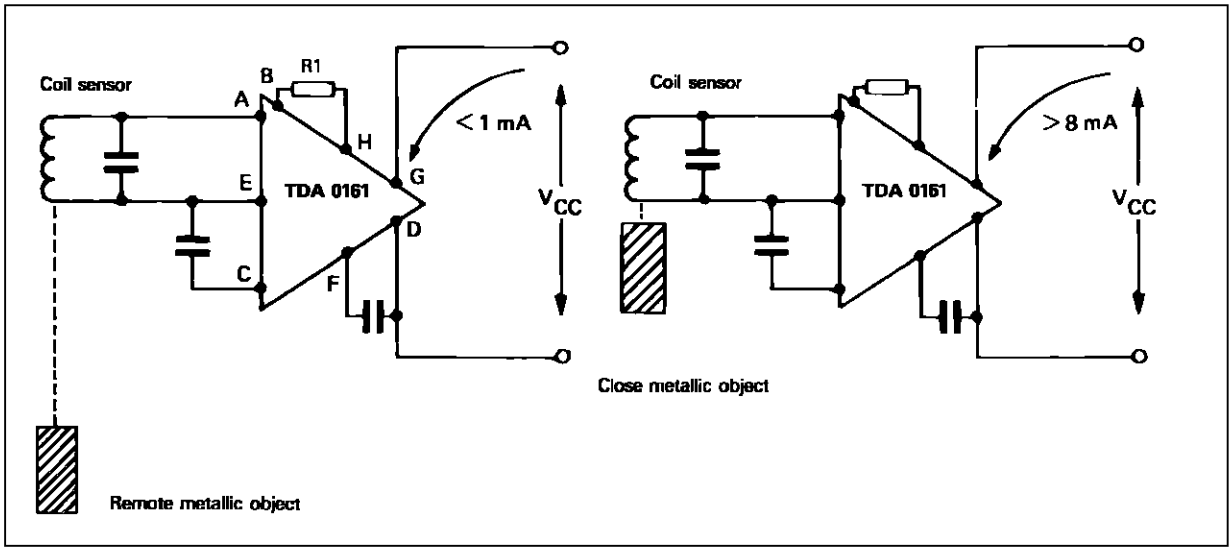
OPERATING MODE

Between terminals A and E, the integrated circuit acts like a negative resistance equal to the external resistor R1 connected between terminals B and H.

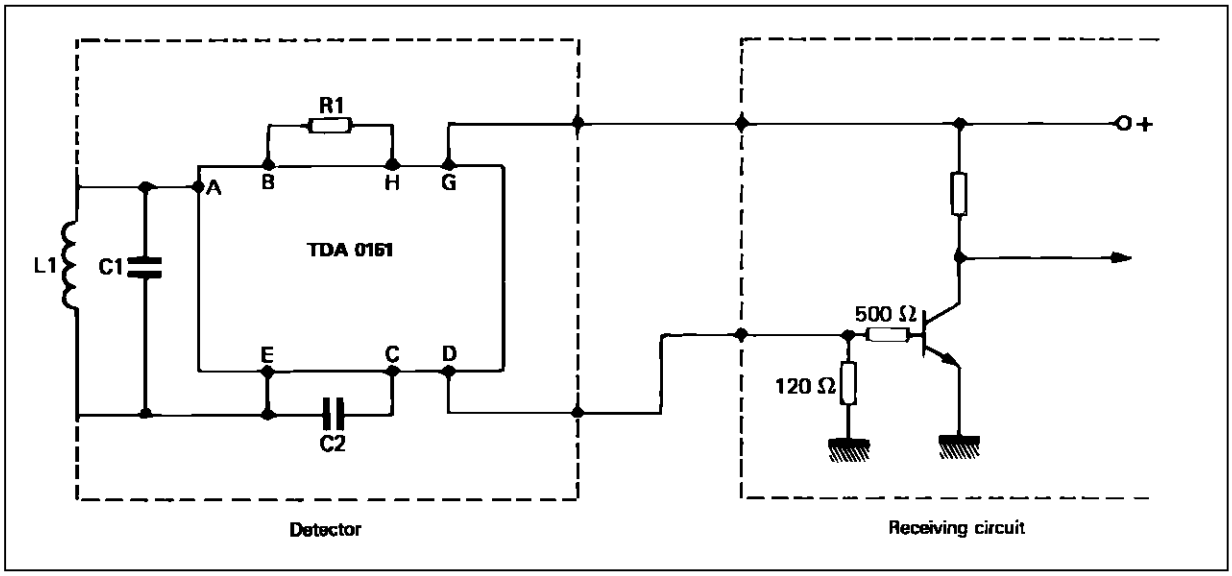
The oscillation stops when loss resistance Rp of tuned circuit becomes smaller than R1. Then, the supply current will be I_{CC} = 10mA (pins G and D).

The oscillation sustains when loss resistance Rp of tuned circuit becomes higher than R1. Then, the supply current will be I_{CC} 1mA (pins G and D).

Eddy currents induced by coil L1 in a metallic body, determine loss resistance Rp.



TYPICAL APPLICATIONS



Detection Range (*)	L1 (μH)		C1 (pF)	f_{osc} (kHz)	R1 (kΩ)	C2 pF
2mm	30	(1)	120	2650	6.8	47
5mm	300	(2)	470	425	27	470
10mm	2160	(3)	4700	50	27	3300

(*) Ingot steel target

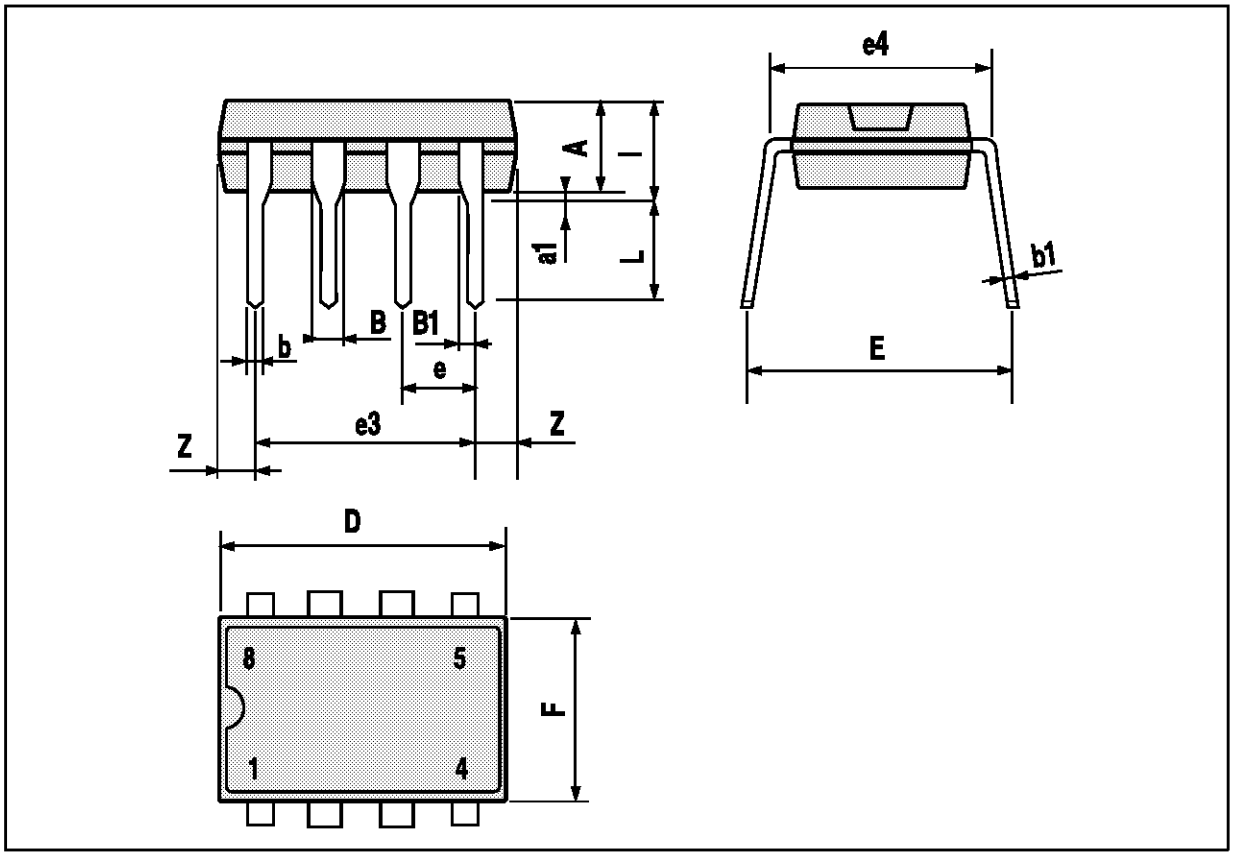
COIL CHARACTERISTICS

	Core	Coil Former	Wire**	Number of Turns
1	Cofelec 432 FP 9 x 5 SE	1/2 CAR 091 - 2	THOMSON Fils et Câbles Thomrex 14 (14/100mm)	40
2	Cofelec 432 FP 14 x 8 SE	1/2 CAR 142 - 2	THOMSON Fils et Câbles Thomrex 14 (14/100mm)	100
3	Cofelec 432 FP 26 x 16 SE	1/2 CAR 262 - 2	THOMSON Fils et Câbles Thomrex 14 (14/100mm)	200

** The above results are obtained with single wire coil. When using Litz wire instead of single wire, the parallel resistance of the coil becomes higher and the value of R1 may be increased, resulting in better sensitivity.

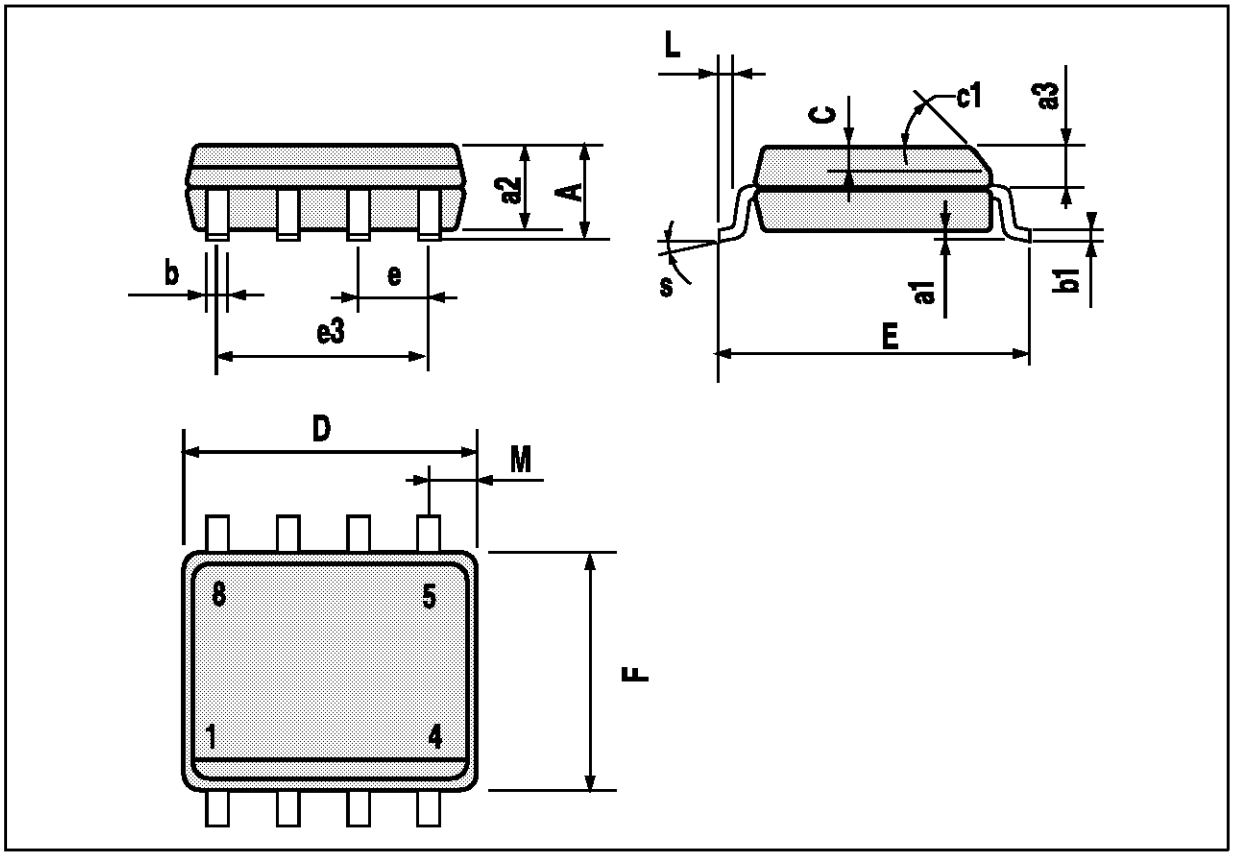
MINIDIP PACKAGE MECHANICAL DATA

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



SO8 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.15		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					



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