

**Colegio Salesiano “San Bartolomé”
Málaga**

Comprobador de diodos y transistores

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Desarrollo de Productos Electrónicos
Asignatura: Desarrollo y construcción de prototipos**

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MEMORIA

Comprobador de diodos y transistores

Para este sencillo comprobador sólo se necesitan un puñado de componentes. Puede usarse para medir los siguientes parámetros:

Transistor: (tanto para PNP como NPN)

- Corriente de fugas de colector ICEO: tres escalas (100 μ A, 1 mA y 10 mA) seleccionadas mediante S3.

- Ganancia en corriente: tres escalas (x100, $I_B=100\mu$ A; x500, $I_B=20\mu$ A; x1000, $I_B=10\mu$ A), seleccionadas con S1.

La medida se lleva a cabo fijando S3 en la escala de 10 mA, seleccionando la escala requerida con S1 y pulsando S4.

Diodos:

Corriente de fugas

Corriente nominal en función del valor de P1.

Lista de componentes:

R1 = 39K

R2 = 180K

R3 = 390K

R4 = 330

R5 = 110 (100+10)

R6 = 10

B = pila de 4,5 V

M = instrumento de 100 A, Ri = IK

S1 = conmutador 3 pos./1 circ.

S2 = cuádruple interruptor

S3 = conmutador 3 pos./1 circ.

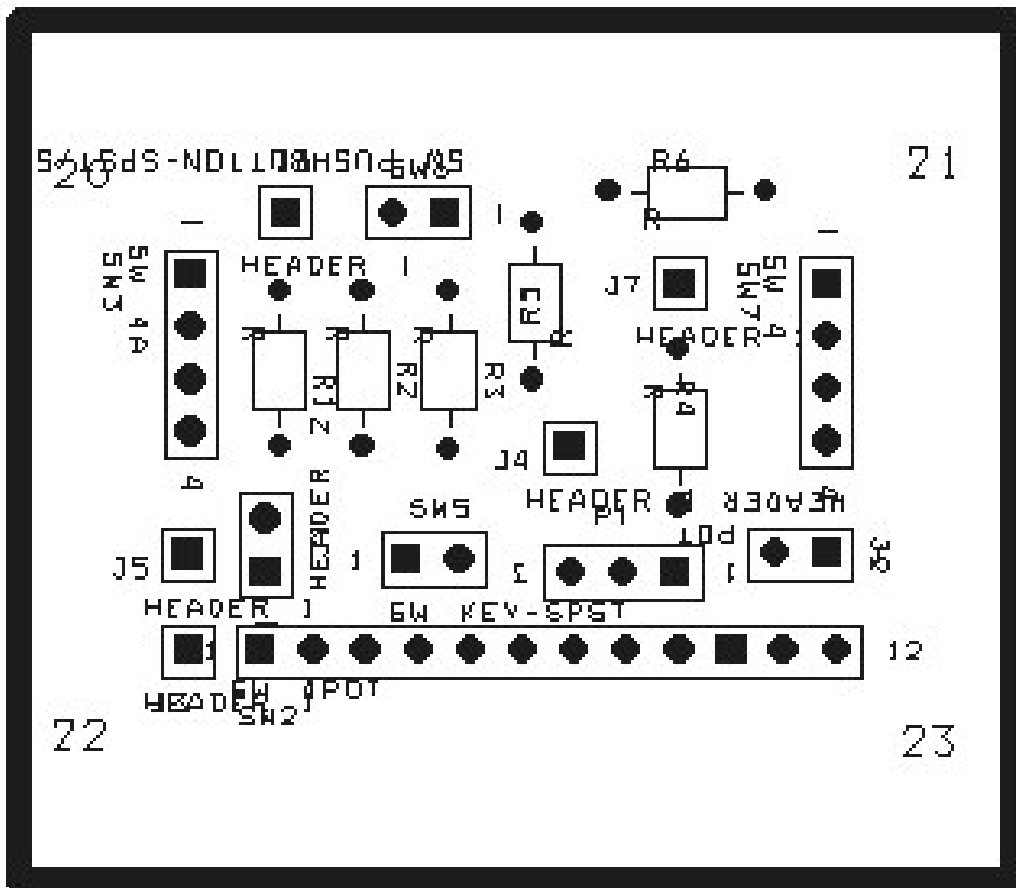
S4 = pulsador

S5 = interruptor de encendido/apagado

ESQUEMA ELÉCTRICO

CAPAS

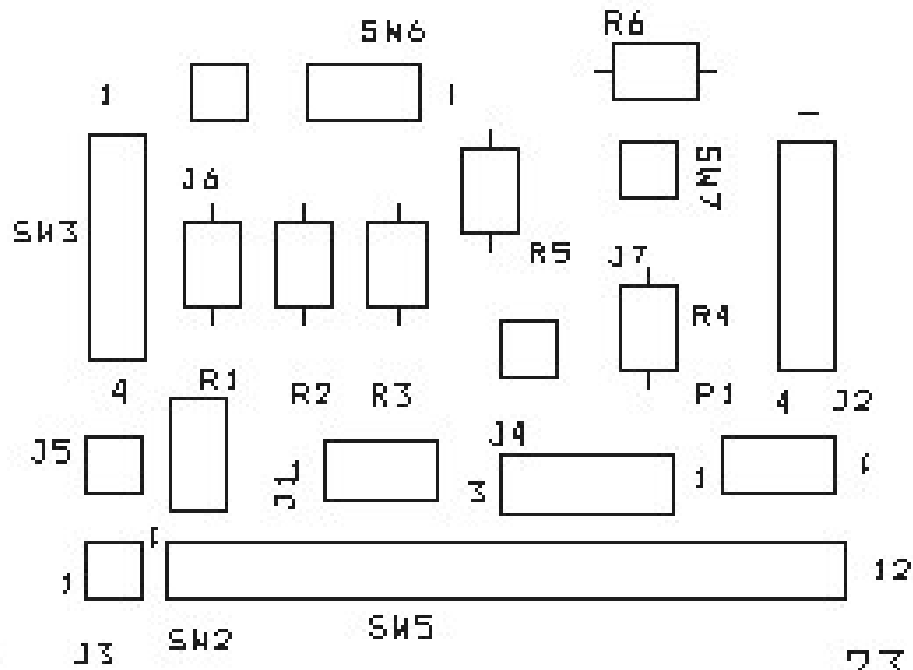
- 1 – AST
- 2 – SST
- 3 – TOP
- 4 – BOT
- 5- DRD



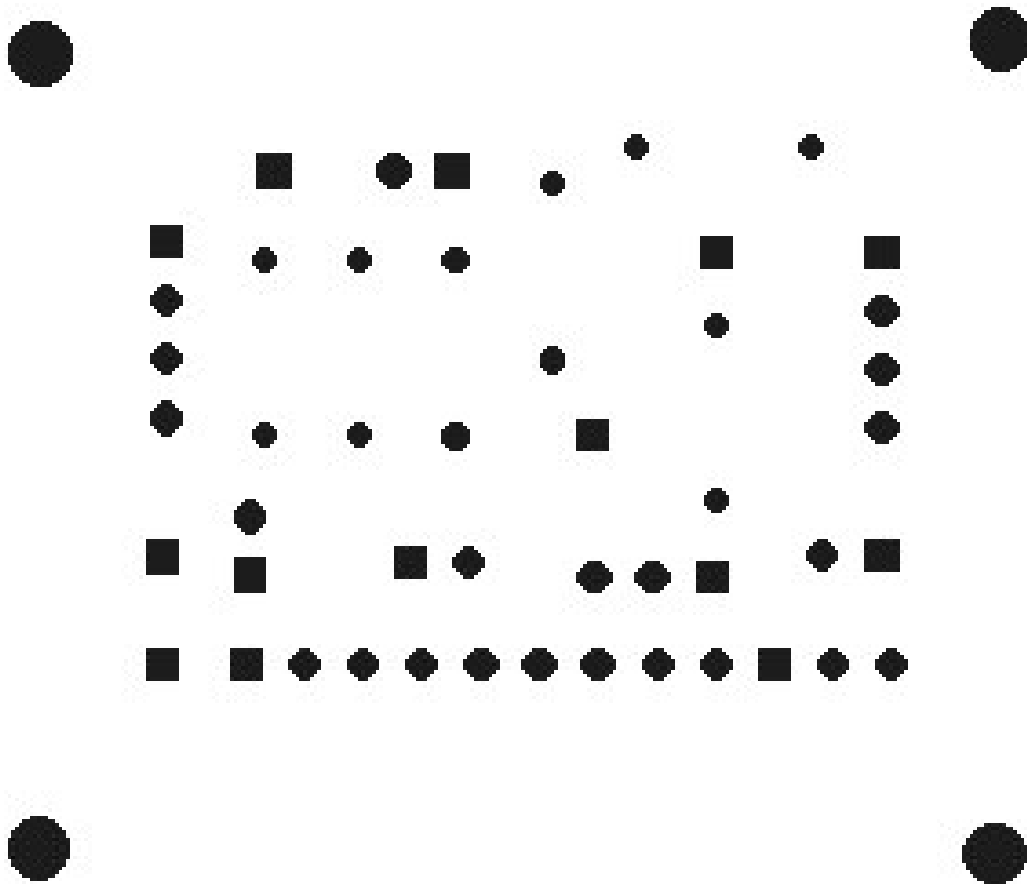
CAPA (AST)

20

21

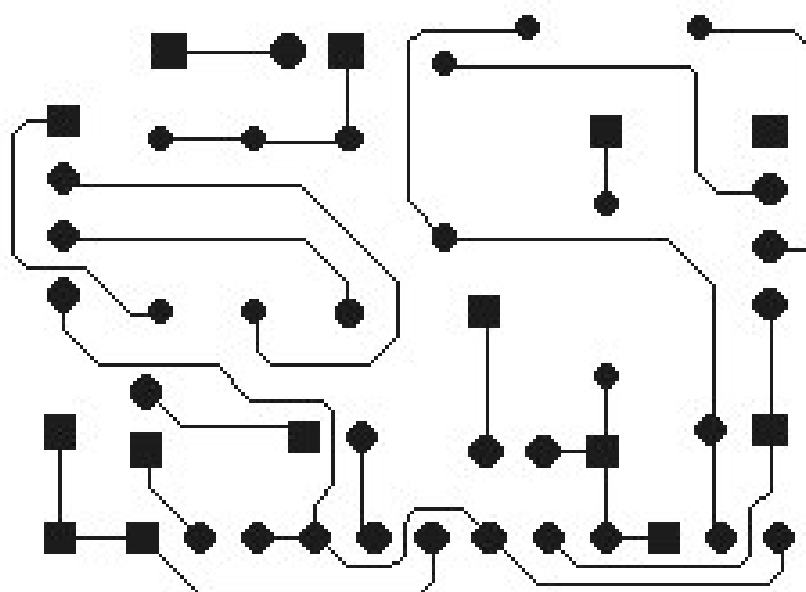


CAPA (SST)



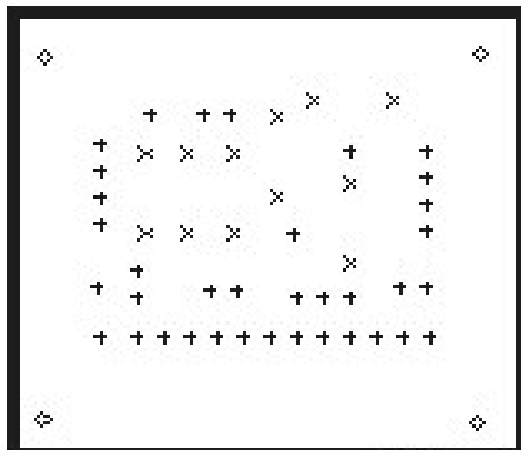
CAPA (TOP)

Comprobador de diodos
y transistores



ALFDNSD J. 11/02/03

CAPA (BOT)



DRILL CHART				
SYM	DIAM	TOL	QTY	NOTE
x	0.028		12	
+	0.037		36	
◇	0.110		4	
TOTAL			52	

CAPA (DRD)

INFORMES

```
*****
*
* DRILL LIST REPORT
*
* C:\ALFONSO J02COMPDI0\02COMPDI0.MAX
* Wed Mar 26 13:25:53 2003
*
*****
```

COMMENTS DRILL TOOL XCOORD YCOORD

THRUHOLES

28.00 m 1	496.00 m	832.00 m
28.00 m 1	496.00 m	1132.00 m
28.00 m 1	657.00 m	832.00 m
28.00 m 1	657.00 m	1132.00 m
28.00 m 1	821.00 m	830.00 m
28.00 m 1	821.00 m	1130.00 m
28.00 m 1	984.00 m	961.00 m
28.00 m 1	984.00 m	1261.00 m
28.00 m 1	1127.00 m	1323.00 m
28.00 m 1	1262.00 m	720.00 m
28.00 m 1	1262.00 m	1020.00 m
28.00 m 1	1427.00 m	1323.00 m
37.00 m 2	321.00 m	626.00 m
37.00 m 2	323.00 m	443.00 m
37.00 m 2	327.00 m	862.00 m
37.00 m 2	327.00 m	962.00 m
37.00 m 2	327.00 m	1062.00 m
37.00 m 2	327.00 m	1162.00 m
37.00 m 2	463.00 m	443.00 m
37.00 m 2	471.00 m	594.00 m
37.00 m 2	471.00 m	694.00 m
37.00 m 2	510.00 m	1282.00 m
37.00 m 2	563.00 m	443.00 m
37.00 m 2	663.00 m	443.00 m
37.00 m 2	714.00 m	1282.00 m
37.00 m 2	742.00 m	617.00 m
37.00 m 2	763.00 m	443.00 m
37.00 m 2	814.00 m	1282.00 m
37.00 m 2	842.00 m	617.00 m
37.00 m 2	863.00 m	443.00 m
37.00 m 2	963.00 m	443.00 m
37.00 m 2	1054.00 m	833.00 m
37.00 m 2	1056.00 m	592.00 m
37.00 m 2	1063.00 m	443.00 m
37.00 m 2	1156.00 m	592.00 m
37.00 m 2	1163.00 m	443.00 m

37.00 m 2	1256.00 m	592.00 m
37.00 m 2	1263.00 m	443.00 m
37.00 m 2	1265.00 m	1145.00 m
37.00 m 2	1363.00 m	443.00 m
37.00 m 2	1445.00 m	629.00 m
37.00 m 2	1463.00 m	443.00 m
37.00 m 2	1545.00 m	629.00 m
37.00 m 2	1545.00 m	844.00 m
37.00 m 2	1545.00 m	944.00 m
37.00 m 2	1545.00 m	1044.00 m
37.00 m 2	1545.00 m	1144.00 m
37.00 m 2	1563.00 m	443.00 m
110.0.. 3	111.00 m	132.00 m
110.0.. 3	115.00 m	1483.00 m
110.0.. 3	1736.00 m	121.00 m
110.0.. 3	1748.00 m	1505.00 m

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*****
*
* STATISTICS REPORT
*
* C:\ALFONSO J02COMPDI0\02COMPDI0.MAX
* Tue Feb 11 09:23:40 2003
*
*****
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STATISTIC	ENABLED	TOTAL
Board Area	3.1	3.1
Equivalent IC's	3.2	3.5
Sq. inches per IC	0.98	0.90
# of pins	48	52
Layers	4	28
Design Rule Errors	0	0
Time Used	4:57	4:57
% Placed	100.00%	100.00%
Placed	19	23
Off board	0	0
Unplaced	0	0
Clustered	0	0
Routed	30	30
% Routed	100.00%	100.00%
Unrouted	0	0
% Unrouted	0.00%	0.00%
Partials	0	0
% Partials	0.00%	0.00%
Vias	0	0
Test Points	0	0
Vias per Conn	0.00	0.00
Segments	102	102
Connections	30	30
Nets	17	17
Components	19	23
Footprints	56	56
Padstacks	23	23
Obstacles	164	164
Theoretical Dist	10.2	10.2
Routed Dist	11.0	11.0
Unrouted Dist	0.0	0.0

```
*****
*
* Component List (Generic)
*
* C:\ALFONSO J\02COMPDI0\02COMPDI0.MAX
* Tue Feb 11 09:23:40 2003
*
*****
```

REF	DES	VALUE	PACKAGE	FOOTPRINT	X LOC	Y LOC
20			MTHOLE1	115.00 m 1483.00 m 0		
21			MTHOLE1_REV1	1748.00 m 1505.00 m 0		
22			MTHOLE1_REV2	111.00 m 132.00 m 0		
23			MTHOLE1_REV3	1736.00 m 121.00 m 0		
J1	HEADER 2		HEADER_2	BLKCON.100/VH/TM1SQ/W.100/2	471.00 m	594.00 m
90						
J2	HEADER 2		HEADER_2	BLKCON.100/VH/TM1SQ/W.100/2	1545.00 m	629.00 m
180						
J3	HEADER 1		HEADER_1	BLKCON.100/VH/TM1SQ/W.100/1	323.00 m	443.00 m
0						
J4	HEADER 1		HEADER_1	BLKCON.100/VH/TM1SQ/W.100/1	1054.00 m	833.00 m
0						
J5	HEADER 1		HEADER_1	BLKCON.100/VH/TM1SQ/W.100/1	321.00 m	626.00 m
0						
J6	HEADER 1		HEADER_1	BLKCON.100/VH/TM1SQ/W.100/1	510.00 m	1282.00 m
0						
J7	HEADER 1		HEADER_1	BLKCON.100/VH/TM1SQ/W.100/1	1265.00 m	1145.00 m
0						
P1	POT	POT		BLKCON.100/VH/TM1SQ/W.100/3	1256.00 m	592.00 m 180
R1	R	R	AX/.300X.100/.028	496.00 m 1132.00 m 270		
R2	R	R	AX/.300X.100/.028	657.00 m 1132.00 m 270		
R3	R	R	AX/.300X.100/.028	821.00 m 1130.00 m 270		
R4	R	R	AX/.300X.100/.028	1262.00 m 1020.00 m 270		
R5	R	R	AX/.300X.100/.028	984.00 m 961.00 m 90		
R6	R	R	AX/.300X.100/.028	1127.00 m 1323.00 m 0		
SW2	SW 4PDT		SW_4PDT	BLKCON.100/VH/TM1SQ/W.100/12	463.00 m	443.00 m
0						
SW3	SW 4A		SW_ROTARY_1P-5..	BLKCON.100/VH/TM1SQ/W.100/4	327.00 m	
1162.00 m 270						
SW5	SW KEY-SPST		SW_KEY-SPST	BLKCON.100/VH/TM1SQ/W.100/2	742.00 m	
617.00 m 0						
SW6	SW PUSHBUTTON-..		SW_PUSHBUTTON-..	BLKCON.100/VH/TM1SQ/W.100/2	814.00 m	
1282.00 m 180						
SW7	SW 4		SW_ROTARY_1P-5..	BLKCON.100/VH/TM1SQ/W.100/4	1545.00 m	
1144.00 m 270						

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*****
*
* Through Hole Top Report
*
* C:\ALFONSO J\02COMPDI0\02COMPDI0.MAX
* Tue Feb 11 09:23:40 2003
*
*****
```

REF	DES	VALUE	PACKAGE	FOOTPRINT	X INSERT	Y INSERT	ROTATION
20			MTHOLE1	115.00 m 1483.00 m 0			
21			MTHOLE1_REV1	1748.00 m 1505.00 m 0			
22			MTHOLE1_REV2	111.00 m 132.00 m 0			
23			MTHOLE1_REV3	1736.00 m 121.00 m 0			
J1	HEADER 2		HEADER_2	BLKCON.100/VH/TM1SQ/W.100/2	471.00 m	594.00 m	
90							
J2	HEADER 2		HEADER_2	BLKCON.100/VH/TM1SQ/W.100/2	1545.00 m	629.00 m	
180							
J3	HEADER 1		HEADER_1	BLKCON.100/VH/TM1SQ/W.100/1	323.00 m	443.00 m	
0							
J4	HEADER 1		HEADER_1	BLKCON.100/VH/TM1SQ/W.100/1	1054.00 m	833.00 m	
0							
J5	HEADER 1		HEADER_1	BLKCON.100/VH/TM1SQ/W.100/1	321.00 m	626.00 m	
0							
J6	HEADER 1		HEADER_1	BLKCON.100/VH/TM1SQ/W.100/1	510.00 m	1282.00 m	
0							
J7	HEADER 1		HEADER_1	BLKCON.100/VH/TM1SQ/W.100/1	1265.00 m	1145.00 m	
0							
P1	POT	POT		BLKCON.100/VH/TM1SQ/W.100/3	1256.00 m	592.00 m	180
R1	R	R	AX/.300X.100/.028	496.00 m 1132.00 m 270			
R2	R	R	AX/.300X.100/.028	657.00 m 1132.00 m 270			
R3	R	R	AX/.300X.100/.028	821.00 m 1130.00 m 270			
R4	R	R	AX/.300X.100/.028	1262.00 m 1020.00 m 270			
R5	R	R	AX/.300X.100/.028	984.00 m 961.00 m 90			
R6	R	R	AX/.300X.100/.028	1127.00 m 1323.00 m 0			
SW2	SW 4PDT		SW_4PDT	BLKCON.100/VH/TM1SQ/W.100/12	463.00 m	443.00 m	
0							
SW3	SW 4A		SW_ROTARY_1P-5..	BLKCON.100/VH/TM1SQ/W.100/4	327.00 m		
1162.00 m 270							
SW5	SW KEY-SPST		SW_KEY-SPST	BLKCON.100/VH/TM1SQ/W.100/2	742.00 m		
617.00 m 0							
SW6	SW PUSHBUTTON-..		SW_PUSHBUTTON-..	BLKCON.100/VH/TM1SQ/W.100/2	814.00 m		
1282.00 m 180							
SW7	SW 4		SW_ROTARY_1P-5..	BLKCON.100/VH/TM1SQ/W.100/4	1545.00 m		
1144.00 m 270							

El técnico superior:

A handwritten signature in black ink that reads "A. Calero". The signature is written in a stylized, cursive-like font. A diagonal arrow is drawn over the signature, starting from the bottom left and pointing towards the top right.

Fdo: Alfonso J. Calero Pino