Característiques resumides i connexionat de diodes transistors i circuits integrats

Resistències normalitzades del 5% de tolerància.

Valors en ohm.

10	3900
12	4700
15	5600
18	6800
22	8200
27	10000
33	12000
39	15000
47	18000
56	22000
68	27000
82	33000
100	39000
120	47000
150	56000
180	68000
220	82000
270	100000
330	120000
390	150000
470	180000
560	220000
680	270000
820	330000
1000	390000
1200	470000
1500	560000
1800	680000
2200	820000
2700	1000000
3300	

ABREVIATURAS

DIODOS "APLICACIONES"

AFC	CONTROL AUTOMATICO DE FRECUENCIA
AGC	OBTENCION DE LA TENSION REGULADA
AM	APLICACION DE ALTA FRECUENCIA (GAMA AM)
ARRAY	MONTAJE DE VARIOS COMPONENTES EN UNA SOLA CAPSULA
BAND-S	CONMUTACION DE GAMA EN ALTA FRECUENCIA
Br.	PUENTE RECTIFICADOR
CONTRA.AV.	AVALANCHA CONTROLADA
DEM.	DEMODULADOR
DISKr.	DISCRIMINADOR
DUAL	DIODO DOBLE
FED	DIODOS DE EFECTO DE CAMPO
FM	APLICACION DE ALTA FRECUENCIA (GAMA FM)
GEP	TIPOS APAREJADOS
GI	RECTIFICADOR EN GENERAL
HF	APLICACIONES DE ALTA FRECUENCIA
KL	DIODO DE ENGANCHE PARA T.V.
L	TIPO DE POTENCIA
M	ETAPAS MEZCLADORAS
MIN	MODELO MINIATURA
MULTIPL.	MULTIPLICADOR DE FRECUENCIA
NF	APLICACION DE BAJA FRECUENCIA
O	ETAPAS OSCILADORAS
PIN-DI	DIODO PIN
RA	BAJO RUIDO
S	ETAPAS DE CONMUTACION
SN	FUENTES DE ALIMENTACION CONMUTADA
SS	ETAPAS DE CONMUTACION ULTRARRAPIDAS
STABI	DIODO ESTABILIZADOR
TAZ	DIODO SUPRESOR
TUNING	DIODO SINTONIZADOR DE ALTA FRECUENCIA
TUNNEL-DI	DIODO TUNEL
TV	APLICACIONES EN TV
UHF	APLICACIONES ALTA FRECUENCIA >250 MHz
UNI	TIPO UNIVERSAL
VHF	APLICACIONES ALTA FRECUENCIA 100-250 MHz
VID	ETAPAS VIDEO
Z	DIODOS ZENER
Z-Ref.	DIODO ZENER DE TENSION DE REFERENCIA

TRANSISTORES "APLICACIONES"

A	AMPLIFICADOR DE ANTENA Y DE BANDA ANCHA
AM-VM	APLICACION DE ALTA FRECUANCIA (Gama AM)
CTV	TELEVISION EN COLOR
CHOPPER	INVERSOR DE MEDIDA
DARL	TRANSISTOR DARLINGTON
DUAL	TRANSISTOR DOBLE PARA AMPLIFICADOR DIFERENCIAL
E	ETAPAS DE SALIDA
FM-M	APLICACION EN ALTA FRECUENCIA (ETAPA MEZCLADORA) GAMA FM
FM-V	APLICACION EN ALTA FRECUENCIA ETAPA PREVIA O DE ENTRADA
HA	ETAPAS DE BARRIDO HORIZONTAL EN TV
HF	APLICACION EN ALTA FRECUENCIA (EN GENERAL)
L	ETAPA DE POTENCIA
M	ETAPA MEZCLADORAS
MIN	TIPO MINIATURA
N-DARL	TRANSISTOR DARLINGTON NPN
N-FET	TRANSISTOR DE EFECTO DE CAMPO CANAL N
NF	APLICACION EN BAJA FRECUENCIA
NF-L	APLICACION EN BAJA FRECUENCIA EN ETAPA DE POTENCIA
NIX	EXCITADOR NIXIE (VALVULAS - DISPLAY DE CIFRAS)
O	ETAPAS OSCILADORAS
P-DARL	TRANSISTOR DARLINGTON PNP
P-FET	TRANSISTOR DE EFECTO DE CAMPO CANAL P
PUT	TRANSISTOR UNIUNION (UJT) PROGRAMABLE
RA	BAJO RUIDO
RE	ETAPAS REGULADAS
RU	DE BAJO RONQUIDO
S	ETAPAS CONMUTADORAS
SN	CIRCUITO COMBINADO TV
SS	ETAPAS DE CONMUTACION RAPIDAS
SSB	BANDA LATERAL UNICA
SYM	TIPOS SYMETRICOS
TV	APLICACION DE TELEVISION
TR	ETAPAS EXCITADORAS
UHF	APLICACIONES EN ALTA FRECUENCIA (> 250 MHZ)
UJT	TRANSISTOR UNIUNION
UNI	COMPONENTES UNIVERSALES
V	ETAPAS PREVIAS O DE ENTRADA
VA	ESTADO DEFLEXION VERTICAL (T.V.)
VHF	APLICACIONES AF (100 250 MHZ)
VID	APLICACIONES DE SALIDA DE VIDEO
ZF	ETAPAS DE FRECUENCIA INTERMEDIA
ZV	CON AMPLIFICACION DE ENCENDIDO (DARLISTOR)

DIODOS

MODELO	MAT.	APL.	I.	V.	CAPSULA
AA-119	GE	DEM	35 mA.	45 V.	DO-7
AA-138	GE	TV-DEM	0'1 A.	15 V.	DO-35
BA-102	SI	VHF-AFC	50 mA.	20 V.	DO-7
BA-114	SI	STABI	0'2 A.	9 V.	DO-7
BA-157	SI	S-TV KI	1 A.	400 V.	DO-41
BA-159	SI	S-TV KI	1 A.	1000 V.	DO-41
BA-243	SI	VHF-S	0'1 A.	20 V.	DO-35
BA-317	SI	S-UNI	0'1 A.	30 V.	DO-35
BAT-42	SI	SCHOTTKY	100 mA.	30 V.	DO-35
BAV-10	SI	S	0'3 A.	67 V.	DO-7
BAV-20	SI	S	0'25 A.	150 V.	DO-35
BAV-54/30	SI	S	0'2 A.	30 V.	DO-35
BAV-54/70	SI	S	0'2 A.	70 V.	DO-35
BAX-13	SI	S-UNI	0'75 A.	50 V	SOD-17.
BAY-31	SI	S	0'1 A.	15 V.	DO-7
BB-105 B	SI	UHF-TUN/NG	0'02 A.	28 V.	SOD-23 VARICAP
BB-105 G	SI	UHF-TUN/NG	0'02 A.	28 V.	SOD-23 VARICAP
BB-106	SI	UHF-TUN/NG	0'02 A.	28 V.	SOD-23 VARICAP
BB-204	SI	DUAL,FM-TUNING	0,1 A.	30 V.	TO-92
BY-121	SI	GI	0'5 A.	400 V.	ESPC.
BY-127	SI	GI	1 A.	1200 V.	SOD-18
BY-206	SI	TV-GI	0'4 A.	300 V.	DO-14
BY-214/400	SI	GI	6 A.	400 V.	DO-13
BY-228	SI	TV-DAMPER	5 A.	1500 V.	SOD-64
BY-229/600	SI	TV-DAMPER	7 A.	600 V.	TO-220
BY-239/800	SI	GI-L	10 A.	800 V.	TO-220
BY-251	SI	GI-UNI	3 A.	200 V.	DO-27
BY-252	SI	GI-UNI	3 A.	400 V.	DO-27
BY-253	SI	GI-UNI	3 A.	600 V.	DO-27
BY-255	SI	GI-UNI	3 A.	1300 V.	DO-27
BY-291/450	SI	TV-G	1 A.	450 V.	ESPECIAL
BY-292/300	SI	TV-G	1'4 A.	300 V.	ESPECIAL
BY-299	SI	TV-GI	2 A.	800 V.	DO-27A
BY-329/1000	SI	TV-DAMPER RAPIDO	8 A.	1000 V.	TO-220
BYT 11-1000	SI	RAPIDO	1 A.	1000 V.	DO-41
BYW-29/200	SI	GI-L	7 A.	200 V.	TO-220

* GE = GERMANIO
* SI = SILICIO

(2)

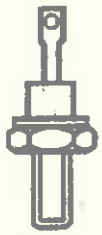
DIODOS

MODELO	MAT.	APL.	I.	V.	CAPSULA
BYW-88/400 BR	SI	GI-L	12 A.	400 V.R	DO-4
BYW-88/800 BR	SI	GI-L	12 A.	800 V.R	DO-4
BYW-95 B	SI	S.AVA. CONT.	3 A.	400 V.	SOD-64
BYW-98/200	SI	GI-S	3 A.	200 V.	DO-27A
BYX-10	SI	GI-UNI	0'36 A.	1300 V.	DO-14
BYX-38/600	SI	GI-L	6 A.	600 V.	DO-4
BYX-48/300	SI	GI-L	6 A.	300 V.	DO-4
BYX-55/600	SI	GI/S	5 A.	600 V.	SOD-18
BYY-10	SI	GI-L	0'5 A.	1200 V.	DO-35
BYY-16	SI	GI-L	40 A.	800 V.	DO-4
BZV-38	SI	Z	0'05 A.	Ref. 5 %	DO-35
DA-251	SI	GI	3 A.	400 V.	DO-27
MD-60	SI	GI-UNI	1 A.	60 V.	TO-126
MR-811	SI	GI-S	1 A.	100 V.	SOD-22
MUR-1560	SI	RAPIDO	15 A.	600 V	TO-220
OA-7	GE	S	0'14 A.	25 V,	TO-44
OA-90	GE	VID	30 mA	20 V.	DO-7
OA-91	GE	UNI	50 mA	90 V.	DO-7
OA-95	GE	UNI	50 mA	90 V.	DO-7
SB-140	SI	SCHOTTKY	1 A.	40 V.	DO-41
SB-160	SI	SCHOTTKY	1 A.	60 V.	DO-41
SB-520	SI	SCHOTTKY	5 A.	20 V.	DO-27A
SB-530	SI	SCHOTTKY	5 A.	30 V.	DO-27A
SB-540	SI	SCHOTTKY	5 A.	40 V.	DO-27A
SBL-1630 T	SI	SCHOTTKY	16 A.	30 V.	TO-220
SBP-1660 T	SI	SCHOTTKY	16 A.	60 V.	TO-220
SBS-820 T	SI	SCHOTTKY	8 A.	20 V.	TO-220
SBS-860 T	SI	SCHOTTKY	8 A.	60 V.	TO-220
SBS-1620 T	SI	SCHOTTKY	16 A.	20 V.	TO-220
SBS-1645 T	SI	SCHOTTKY	16 A.	45 V.	TO-220
SFD-104	GE	VID	20 mA.	25 V.	DO-7
SFD-107	GE	VID	20 mA.	10 V.	DO-7

* GE = GERMANIO
* SI = SILICIO

(3)

DIODOS



MODELO	MAT.	APL.	I.	V.	CAPSULA
SW-04 PCR 020	SI	GI-L	30 A.	400 V.	DO-4 A.R.
SW-08 PCR 020	SI	GI-L	30 A.	800 V.	DO-4 A.R.
SW-12 PCR 020	SI	GI-L	30 A.	1200 V.	DO-4 A.R.
SW-04 PCN 020	SI	GI-L	30 A.	400 V.	DO-4 C.R.
SW-08 PCN 020	SI	GI-L	30 A.	800 V.	DO-4 C.R.
SW-12 PCN 020	SI	GI-L	30 A.	1200 V.	DO-4 C.R.
SW-04 PCR 040	SI	GI-L	70 A.	400 V.	DO-5 A.R.
SW-08 PCR 040	SI	GI-L	70 A.	800 V.	DO-5 A.R.
SW-12 PCR 040	SI	GI-L	70 A.	1200 V.	DO-5 A.R.
SW-04 PCN 040	SI	GI-L	70 A.	400 V.	DO-5 C.R.
SW-08 PCN 040	SI	GI-L	70 A.	800 V.	DO-5 C.R.
SW-12 PCN 040	SI	GI-L	70 A.	1200 V.	DO-5 C.R.
SYX-55/350	SI	Rec-RAPIDA	1 A.	350 V.	SOD-18
1N 2860 A	SI	GI	0'75 A.	200 V.	DO-1
1N 3195	SI	GI	0'75 A.	600 V.	DO-12
1N 3292 R	SI	GI-L	100 A.	500 V.R	DO-8
1N 3739	SI	GI-L	250 A.	400 V.	DO-9
1N 4004	SI	GI-UNI	1 A.	400 V.	DO-41
1N 4007	SI	GI-UNI	1 A.	1000 V.	DO-41
1N 4148	SI	SS	0'2 A.	100 V.	DO-35
1N 4448	SI	SS	0'2 A.	100 V.	DO-35
1N 5060	SI	GI-AVA-CONT	1 A.	400 V.	SOD-57
1N 5397	SI	GI	1'5 A.	600 V.	DO-41
1N 5627	SI	GI	5 A.	800 V.	SOD-64
1N 5711=BAR-28	SI	UNI	15 mA.	70 V.	DO-35
40 G-6 R	SI	GI-L	40 A.	600 V.R	DO-5
40 G-8 R	SI	GI-L	40 A.	800 V.R	DO-5
40 G-12 R	SI	GI-L	40 A.	1200 V.R	DO-5
41 HFR-5	SI	GI-L	40 A.	1200 V.	DO-5
45 L-120	SI	GI-L	150 A.	1200 V.	DO-30
45 LR-120	SI	GI-L	150 A.	1200 V.R	DO-30
5 A-4	SI	GI-L	1 A.	400 V.	SOD-18
70 G-4 R	SI	GI-L	70 A.	400 V.R	DO-5
70 G-8 R	SI	GI-L	70 A.	800 V.R	DO-5

* GE = GERMANIO
* SI = SILICIO

DIODOS ZENERS

MODELO	VOLT.	MW	CAPSULA
BZX-46	2'4 V.	400	DO-35
BZX-46	2'7 V.	400	DO-35
BZX-46	3 v.	400	DO-35
BZX-46	3'3 V.	400	DO-35
BZX-46	3'6 V.	400	DO-35
BZX-46	3'9 V.	400	DO-35
BZX-46	4'3 V.	400	DO-35
BZX-46	4'7 V.	400	DO-35
BZX-46	5'1 V.	400	DO-35
BZX-46	5'6 V.	400	DO-35
BZX-46	6'2 V.	400	DO-35
BZX-46	6'8 V.	400	DO-35
BZX-46	7'5 V.	400	DO-35
BZX-46	8'2 V.	400	DO-35
BZX-46	9'1 V.	400	DO-35
BZX-46	10 V.	400	DO-35
BZX-46	11 V.	400	DO-35
BZX-46	12 V.	400	DO-35
BZX-46	13 V.	400	DO-35
BZX-46	15 V.	400	DO-35
BZX-46	16 V.	400	DO-35
BZX-46	18 V.	400	DO-35
BZX-46	20 V.	400	DO-35
BZX-46	22 V.	400	DO-35
BZX-46	24 V.	400	DO-35
BZX-46	27 V.	400	DO-35
BZX-46	30 V.	400	DO-35
BZX-46	33 V.	400	DO-35
BZX-46	36 V.	400	DO-35
BZX-46	39 V.	400	DO-35
BZX-46	43 V.	400	DO-35
BZX-46	47 V.	400	DO-35
BZX-46	51 V.	400	DO-35
BZX-46	56 V.	400	DO-35
BZX-46	62 V.	400	DO-35
BZX-46	68 V.	400	DO-35
BZX-46	75 V.	400	DO-35

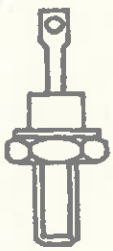
MODELO	VOLT.	W	CAPSULA
BZX-85 C	3V	1	DO-41
1N 4728 A	3V3	1	DO-41
1N 4729 A	3V6	1	DO-41
1N 4730 A	3V9	1	DO-41
1N 4731 A	4V3	1	DO-41
1N 4732 A	4V7	1	DO-41
1N 4733 A	5V1	1	DO-41
1N 4734 A	5V6	1	DO-41
1N 4735 A	6V2	1	DO-41
1N 4736 A	6V8	1	DO-41
1N 4737 A	7V5	1	DO-41
1N 4738 A	8V2	1	DO-41
1N 4739 A	9V1	1	DO-41
1N 4740 A	10V.	1	DO-41
1N 4741 A	11V.	1	DO-41
1N 4742 A	12V.	1	DO-41
1N 4743 A	13V.	1	DO-41
1N 4744 A	15V.	1	DO-41
1N 4745 A	16V.	1	DO-41
1N 4746 A	18V.	1	DO-41
1N 4747 A	20V.	1	DO-41
1N 4748 A	22V.	1	DO-41
1N 4749 A	24V.	1	DO-41
1N 4750 A	27V.	1	DO-41
1N 4751 A	30V.	1	DO-41
1N 4752 A	33V.	1	DO-41
1N 4753 A	36V.	1	DO-41
1N 4754 A	39V.	1	DO-41
1N 4755 A	43V.	1	DO-41
1N 4756 A	47V.	1	DO-41
1N 4757 A	51V.	1	DO-41
1N 4758 A	56V.	1	DO-41
1N 4759 A	62V.	1	DO-41
1N 4760 A	68V.	1	DO-41
1N 4761 A	75V.	1	DO-41
BZY-97 C	180V.	1	DO-41

(5)

DIODOS ZENERS

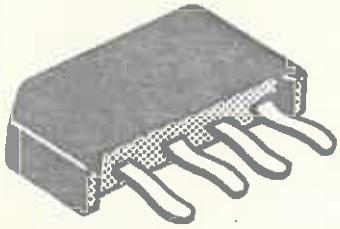
MODELO	VOLT.	W	CAPSULA
BZV-48 C	3V3	5	DO-27 A
BZV-48 C	3V9	5	DO-27 A
BZV-48 C	4V7	5	DO-27 A
BZV-48 C	5V1	5	DO-27 A
BZV-48 C	5V6	5	DO-27 A
BZV-48 C	6V2	5	DO-27 A
BZV-48 C	6V8	5	DO-27 A
BZV-48 C	7V5	5	DO-27 A
BZV-48 C	8V2	5	DO-27 A
BZV-48 C	9V1	5	DO-27 A
BZV-48 C	10 V.	5	DO-27 A
BZV-48 C	12 V.	5	DO-27 A
BZV-48 C	15 V.	5	DO-27 A
BZV-48 C	16 V.	5	DO-27 A
BZV-48 C	18 V.	5	DO-27 A
BZV-48 C	20 V.	5	DO-27 A
BZV-48 C	22 V.	5	DO-27 A
BZV-48 C	24 V.	5	DO-27 A
BZV-48 C	27 V.	5	DO-27 A
BZV-48 C	30 V.	5	DO-27 A
BZV-48 C	33 V.	5	DO-27 A
BZV-48 C	36 V.	5	DO-27 A
BZV-48 C	39 V.	5	DO-27 A

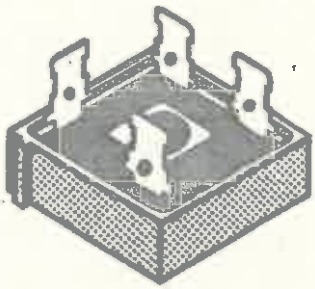
MODELO	VOLT.	W	CAPSULA
BZV-48 C	43 V.	5	DO-27 A
BZV-48 C	47 V.	5	DO-27 A
BZV-48 C	51 V.	5	DO-27 A
BZV-48 C	56 V.	5	DO-27 A
BZV-48 C	62 V.	5	DO-27 A
BZV-48 C	68 V.	5	DO-27 A
BZV-48 C	75 V.	5	DO-27 A
BZV-48 C	100 V.	5	DO-27 A
1N 2970 B	6V8	10	DO-4
1N 2971 B	7V5	10	DO-4
1N 2972 B	8V2	10	DO-4
1N 2973 B	9V1	10	DO-4
1N 2974 B	10 V.	10	DO-4
1N 2982 B	18 V.	10	DO-4
1N 2984 B	20 V.	10	DO-4
1N 2988 B	27 V.	10	DO-4
1N 2989 B	30 V.	10	DO-4
1N 2990 B	33 V.	10	DO-4
1N 2991 B	36 V.	10	DO-4
1N 2992 B	39 V.	10	DO-4
1N 2993 B	43 V.	10	DO-4
1N 2995 B	47 V.	10	DO-4



MODELO	VOLT.	W	CAPSULA
BZX 97/C82	82 V.	1'5	DO-41
BZX 70/C24	24 V.	2'5	SOD-18
BZX 70/C33	33 V.	2'5	SOD-18
BZX 70/C43	43 V.	2'5	SOD-18
BZZ 18/C8V2	8'2 V.	10	DO-4
BZZ 18/C11	11 V.	10	DO-4
BZZ 18/C20	20 V.	10	DO-4

MODELO	VOLT.	W	CAPSULA
BZY 93/C11	11 V.	20	DO-4
BZY 91/C9V1	9 V1	75	TO-48
BZY 91/C16	16 V.	75	TO-48
BZY 91/C27	27 V.	75	TO-48
BZY 91/C30	30 V.	75	TO-48
BZY 91/C39	39 V.	75	TO-48





RECTIFICADORES PUENTE

MODELO	AMP.	VOL.
B 30 C250/200	250 mA.	30 V.
B 30 C300	300 mA.	30 V.
B 30 C400	400 mA.	30 V.
B 30 C650/550	650 mA.	30 V.
B 40 C10	10 A.	40 V.
B 40 C35	35 A.	40 V.
B 40 C1000	1 A.	40 V.
B 40 C1500 R	1,5 A.	40 V.
B 40 C1500/1000 PLANO	1,5 A	40 V.
B 40 C3700/2200	3,7 A	40 V.
B 40 C5000/3300	5 A.	40 V.
B 80 C35	35 A.	80 V.
B 80 C900/600	900 mA.	80 V.
B 80 C1500/1000	1,5 A.	80 V.
B 80 C3700/2200	3,7 A.	80 V.
B 80 C5000/3700	5 A.	80 V.
B 125 C1500/1000	1,5 A.	125 V.
B 125 C3700/2200	3'7 A.	125 V.
B 250 C10	10 A.	250 V.
B 250 C35	35 A.	250 V.
B 250 C1500R	1,5 A.	250 V.
B 250 C1500/1000	1,5 A.	250 V.
B 250 C3700/2200	3,7 A.	250 V.
B 250 C5000/3700	5 A.	250 V.
B 380 C35	35 A.	380 V.
B 380 C1000	1 A.	380 V.
B 380 C1500/1000	1,5 A.	380 V.
B 380 C3200/2200	3,2 A.	380 V.
B 380 C5000/3300	5 A.	380 V.
BY 179	1 A.	400 V.
CSB4	1 A.	400 V.

MODELO	AMP.	VOL.
FB-1006	10 A.	600 V.
FB-5006	50 A.	600 V.
KBPC10/04	10 A.	400 V.
KBPC10/06	10 A.	600 V.
KBPC10/08	10 A.	800 V.
KBPC15/08	15 A.	800 V.
KBPC25/04	25 A.	400 V.
KBPC25/08	25 A.	800 V.
KBPC35/04	35 A.	400 V.
KBPC35/08	35 A.	800 V.
RG-125-6	6 A.	400 V.
RG-125-10	10 A.	400 V.
RG-250-6	6 A.	600 V.
RG-250-10	10 A.	600 V.
RG-380-6	6 A.	1000 V.
RG-380-10	10 A.	1000 V.
VH-448	6 A.	400 V.
VJ-448	10 A.	400 V.
W-04 M	1 A.	400 V.
W-06 M	1 A.	600 V.
2 W-04	2 A.	400 V.

RECTIFICADORES MEDIA ONDA

MODELO	AMP.	VOL.
E-40 C500	500 mA.	40 V.

transistores

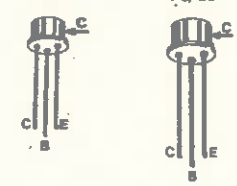
Tipo	PNP NPN	max U_{CEO} (V)	max I_C (mA)	P_{max} (mW)	h_{FE}/I_C	(mA)	compl.	fig.	
BC 107	N	45	100	300	>110	2	BC 177	1	
BC 108	N	20					BC 178	1	
BC 109	N						BC 179	1	
BC 140	N	40	1000	3700	>40	100	BC 160	1	
BC 141	N	60					BC 161	1	
BC 160	P	40					BC 140	1	
BC 161	P	60					BC 141	1	
BC 177	P	45	100	300	>70	2	BC 107	1	
BC 178	P	25			>110		BC 108	1	
BC 179	P	20					BC 109	1	
BC 182	N	50	200		>100		BC 212	2	
BC 183	N	30					BC 213	2	
BC 184	N						BC 214	2	
BC 212	P	50			>60		BC 182	2	
BC 213	P	30			>80		BC 183	2	
BC 214	P				>140		BC 184	2	
BC 237	N	45	100		>110		BC 307	2	
BC 238	N	20					BC 308	2	
BC 239	N		50				BC 309	2	
BC 307	P	45	100		>70		BC 237	2	
BC 308	P	25					BC 238	2	
BC 309	P	20	50				BC 239	2	
BC 327	P	45	500	800	>100	100	BC 337	2	
BC 328	P	25					BC 338	2	
BC 337	N	45					BC 327	2	
BC 338	N	25					BC 328	2	
BC 414	N	50	100	300	>100	2	—	2	
BC 416	P				>120		—	2	
BC 516	P	30	400	625	>30.000	20	BC 517	2	1)
BC 517	N						BC 516	2	1)
BC 546	N	65	100	500	>110	2	BC 556	2	
BC 547	N	45					BC 557	2	
BC 548	N	30					BC 558	2	
BC 549	N	45			>200		—	2	
BC 550	N						—	2	
BC 556	P	65			>75		BC 546	2	
BC 557	P	45					BC 547	2	
BC 558	P	30					BC 548	2	
BC 559	P	45			>125		—	2	
BC 560	P						—	2	
BC 639	N	80	1000	1000	>40	150	BC 640	3	
BC 640	P						BC 639	3	

Tipo	PNP NPN	max U_{CEO} (V)	max I_C (A)	P_{max} (W)	h_{FE}/I_C		compl.	fig.	
BD 131	N	45	3	15	>40	0,5A	BD 132	4	
BD 132	P						BD 131	4	
BD 135	N		1	8		0,15A	BD 136	4	
BD 136	P						BD 135	4	
BD 137	N	60					BD 138	4	
BD 138	P						BD 137	4	
BD 139	N	80					BD 140	4	
BD 140	P						BD 139	4	
BD 169	N		1,5	20			BD 170	4	
BD 170	P						BD 169	4	
BD 183	N		15	117	>20	3 A	—	5	
BD 233	N	45	2	25	40	0,15A	BD 234	4	
BD 234	P						BD 233	4	
BD 235	N	60					BD 236	4	
BD 236	P						BD 235	4	
BD 237	N	80					BD 238	4	
BD 238	P						BD 237	4	
BD 239	N	45	2	30		0,2 A	BD 240	6	2)
BD 240	P						BD 239	6	2)
BD 241	N		3	40	>25	1 A	BD 242	6	2)
BD 242	P						BD 241	6	2)
BD 243	N		6	65	>30	0,3 A	BD 244	6	2)
BD 244	P						BD 243	6	2)
BD 245	N		10	80	>40	1 A	BD 246	7	2)
BD 246	P						BD 245	7	2)
BD 249	N		25	125	>25	1,5 A	BD 250	7	2)
BD 250	P						BD 249	7	2)
BD 435	N	32	4	36	>85	0,5 A	BD 436	4	
BD 436	P						BD 435	4	
BD 437	N	45					BD 438	4	
BD 438	P						BD 437	4	
BD 439	N	60			>40		BD 440	4	
BD 440	P						BD 439	4	
BD 441	N	80					BD 442	4	
BD 442	P						BD 441	4	
BD 643	N	45	8	62,5	>750	3 A	BD 644	7	1)
BD 644	P						BD 643	7	1)
BD 645	N	60					BD 646	7	1)
BD 646	P						BD 645	7	1)
BD 675	N	45	4	40		1,5 A	BD 676	4	1)
BD 676	P						BD 675	4	1)
BD 677	N	60					BD 678	4	1)
BD 678	P						BD 677	4	1)
BD 679	N	80					BD 680	4	1)
BD 680	P						BD 679	4	1)
TIP 31	N	40	3	40	>20	0,5 A	TIP 32	6	2)
TIP 32	P						TIP 31	6	2)
TIP 33	N		10	80			TIP 34	7	2)
TIP 34	P						TIP 33	7	2)
TIP 35	N		25	125	>25	1 A	TIP 36	7	2)
TIP 36	P						TIP 35	7	2)
TIP 41	N		6	65	>20	0,5 A	TIP 42	6	2)
TIP 42	P						TIP 41	6	2)
TIP 122	N	100	8		>1000	5 A	TIP 127	6	1)
TIP 127	P						TIP 122	6	1)
TIP 142	N		15	125			TIP 147	7	1)
TIP 147	P						TIP 142	7	1)
TIP 2955	P	70	15	100	>20	4 A	TIP 3055	7	
TIP 3055	N						TIP 2955	7	
2N3055	N			115			MJ 2955	5	
MJ 2955	P						2N3055	5	
2N 2955	*P*	*25*	*100 m*	*0,3*	*>20*	*10 mA*	—	*1*	

1) darlington

2) max. U_{CEO}:
- ... A = 60 V
- ... B = 80 V
- ... C = 100 V

1 TO-18 TO-39

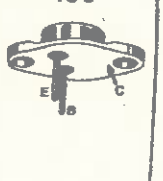


2 TO-92

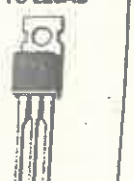
3 TO-92Z

4 TO-126 (SOT-32)

5 TO-3

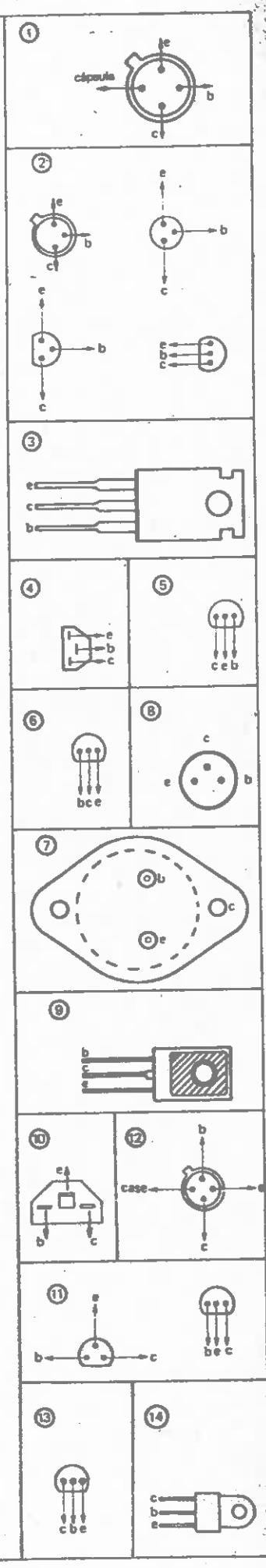


6 TO-220AB



7

Tipo	PNP = P NPN = N	U_{CEO} (Volt) 0 = ≤ 20 00 = 25-40 000 = 45-60 0000 = 65-80 00000 = > 85	$I_{C(max)}$ (mA) 0 = ≤ 50 00 = 55-100 000 = 105-400 0000 = 405-2 A 00000 = > 2 A	P_{max} (mW) Sin refrigerador 0 = ≤ 300 00 = 305-1000 Con refrigerador 00∘ = 1-10 W 00∘∘ = 10-35 W 00∘∘∘ = > 40 W	$h_{FE(min)}$ 0 = ≤ 20 00 = 25-50 000 = 55-120 0000 = > 125	Cápsula nr.	comentarios
TUN	N	0	00	0	000		
TUP	P	0	00	0	000		
AC126	P	0	00	00	0000	2	
AF239	P	0	0	0	0	1	base a masa f
BC107	N	000	00	0	000	2	
BC108	N	0	00	0	000	2	
BC109	N	0	00	0	0000	2	bajo ruido
BC140	N	00	0000	00∘	00	2	
BC141	N	000	0000	00∘	00	2	
BC160	P	00	0000	00∘	00	2	
BC161	P	000	0000	00∘	00	2	
BC182	N	000	000	0	0000	2	
BC212	P	000	000	0	000	2	
BC546	N	0000	00	00	0000	2	
BC556	P	0000	00	00	000	2	
BD106	N	00	00000	00∘∘	00	7	
BD130	N	000	00000	00∘∘∘	0	7	
BD132	P	000	00000	00∘∘	00	9	
BD137	N	000	0000	00∘	00	9	
BD138	P	000	0000	00∘	00	9	
BD139	N	0000	0000	00∘	00	9	
BD140	P	0000	0000	00∘	00	9	
BDY20	N	000	00000	00∘∘∘	0	7	
BF180	N	0	0	0	0	1	base a masa: f_T = 675 MHz
BF185	N	0	0	0	00	12	base a masa: f_T = 220 MHz
BF194	N	0	0	0	000	10	emisor a masa: f_T = 260 MHz
BF195	N	0	0	0	000	10	emisor a masa: f_T = 200 MHz
BF199	N	00	0	00	000	11	emisor a masa: f_T = 550 MHz
BF200	N	0	0	0	00	1	base a masa: f_T = 240 MHz
BF254	N	00	0	0	000	11	emisor a masa: f_T = 260 MHz
BF257	P	00000	00	00	00	2	emisor a masa: f_T = 90 MHz
BF494	N	0	0	0	000	11	emisor a masa: f_T = 260 MHz
BFX34	N	000	00000	00	00	2	f_T = 70 MHz
BFX89	N	0	0	0	00	1	emisor a masa: f_T = 1000 MHz
BFY90	N	0	0	0	00	1	emisor a masa: f_T = 1000 MHz
BSX19	N	0	0000	0	000	2	
BSX20	N	0	0000	0	000	2	
BSX61	N	000	0000	00	000	2	
HEP51	P	00	0000	00	000	1	f_T = 150 MHz
HEP53	N	00	0000	00	000	1	f_T = 200 MHz
HEP56	N	0	00	00	000	5	f_T = 750 MHz
MJE171	P	000	00000	00∘∘	00	9	
MJE180	N	00	00000	00∘∘	00	9	
MJE181	N	000	00000	00∘∘	00	9	
MJE340	N	00000	0000	00∘∘	00	9	
MPS A05	N	000	0000	00	00	13	
MPS A06	N	0000	0000	00	00	13	
MPS A09	N	0000	0	00	000	13	
MPS A10	N	00	00	00	00	13	
MPS A13	N	00	000	00	0000	13	
MPS A16	N	00	00	00	0000	13	
MPS A17	N	00	00	00	0000	13	
MPS A18	N	000	000	00	0000	13	
MPS A55	P	000	0000	0	00	13	
MPS A56	P	0000	0000	0	00	13	
MPS U01	N	00	00000	00∘	00	14	
MPS U05	N	000	00000	00∘	00	14	
MPS U56	P	0000	00000	00∘	00	14	
MPS2926	N	0	00	00	00	13	f_T = 300 MHz
MPS3394	N	00	00	00	000	13	
MPS3702	P	00	000	00	000	13	f_T = 100 MHz
MPS3706	N	0	0000	00	00	13	
MPS6514	N	00	00	0	0000	13	f_T = 480 MHz
TIP29	N	00	0000	00∘∘	0	3	
TIP30	P	00	0000	00∘∘	0	3	
TIP31	N	00	00000	00∘∘∘	0	3	
TIP32	P	00	00000	00∘∘∘	0	3	
TIP140	N	000	00000	00∘∘∘	0000	7	Darlington
TIP142	N	00000	00000	00∘∘∘	0000	7	Darlington
TIP2955	P	000	00000	00∘∘∘	0	3	
TIP3055	N	000	00000	00∘∘∘	0	3	
TIP5530	P	000	00000	00∘∘∘	0	3	
2N696	N	000	0000	00	0	2	
2N706	N	0	0	0	0	2	
2N914	N	0	0000	00	00	2	
2N1613	N	000	0000	00	00	2	
2N1711	N	000	0000	00	000	2	
2N1983	N	00	0000	00	000	2	
2N1984	N	00	0000	00		2	
2N2219	N	00	0000	00	00	2	
2N2222	N	00	0000	00	00	2	
2N2925	N	00	00	0	0000	13	
2N2955	P	00	00	0	0	2	≠ MJE2955, TIP2955!
2N3054	N	000	00000	00∘∘∘	00	7	
2N3055	N	000	00000	00∘∘∘	0	7	
2N3553	N	00	0000	00∘	0	2	f_T = 500 MHz
2N3568	N	000	0000	0	000	13	
2N3638	P	00	0000	0	000	13	
2N3702	P	00	000	00	000	13	
2N3866	N	00	000	00∘	0	2	f_T = 700 MHz
2N3904	N	00	000	0	00	13	
2N3905	P	00	000	00	000	13	
2N3906	P	00	000	00	000	13	
2N3907	N	000	0	0	000	13	
2N4123	N	00	000	0	00	13	
2N4124	N	00	000	0	000	13	
2N4126	P	00	000	0	000	13	
2N4401	N	00	0000	00	0	13	
2N4410	N	0000	000	00	000	13	
2N4427	N	0	000	00∘	0	2	f_T = 700 MHz
2N5183	N	0	0000	00	000	2	



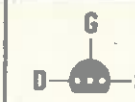
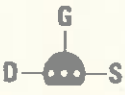
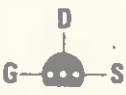
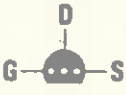
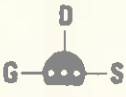
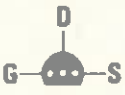
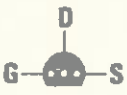
Transistors de potència i alta tensió.

Tipus	U màx	I màx	W màx	ß		Aplic
2N3055	60 V	15 A	115 W	20...70		7
2N3439	350 V	1 A	10 W	40...160(90)		7
2N3902	400 V	2,5 A	100 W	30...90		1,2
2N6052(PNP)	100 V	20 A	150 W	>750		4,5
MJ2501(PNP)	80 V	10 A	150 W	>1000		4,5
MJ4035	100 V	16 A	150 W	>1000		4,5
MJ10001	400 V	30 A	175 W	50...600		5,7
MJ11016	120 V	30 A	200 W	>1000		4,5
BF259	300 V	0,2 A	1 W	>25(130)(40)		3,21
BU180A	400 V	10 A	50 W	>200		4,5,7, 21
BU208A	700 V	7,5 A	12,5 W	>2,25		1,21
BU426A	400 V	8 A	70 W	30		1,7
BU500	700 V	16 A	75 W	>3		1
BU806	400 V	15 A	60 W	>100		5,7
BDX65B	60 V	16 A	117 W	>1000		4,5,21
BUX37	400 V	15 A	35 W	>20		5,7
BUX80	400 V	15 A	100 W	30		7
BUX81	450 V	15 A	100 W	30		7
BUX84	400 V	3 A	40 W	50		7
BUX79	2200 V	2 A	40 W	>1,5		1
TIP50	400 V	2 A	40 W	30...150		7
2SC1172	600 V	6 A	50 W	>10		1
2SC1413	1200 V	16 A	50 W	20		1
2SC1413AH	500 V	16 A	50 W	20		1,11, 21
2SC1755	300 V	0,7 A	15 W	40...200		3,20
2SC1871	400 V	30 A	150 W	>10		7
2SD198	300 V	1 A	25 W	60...200		4,20
2SD200	1500 V	2,5 A	10 W	2,5		1
2SD350	700 V	11 A	22 W	3...8		1

2SD593	400 V	0,3 A	0,8 W	30...200		7
2SD685	400 V	10 A	100 W	>400		5,7
TIP121	80 V	8 A	65 W	>1000		
TIP122	100 V	8 A	65 W	>1000		
TIP132	100 V	12 A	70 W	1000-15000		
TIP141	80 V	15 A	125 W	>500		
TIP142	100 V	15 A	125 W	>500		

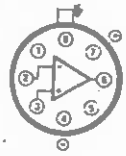
1) Deflexió horitzontal TV. 2) Deflexió vertical TV. 3)Sortida video. 4) Sortida Push-Pull. 5) Darlington. 7) Fonts alimentació, excitadors, relés. 11) Aplicacions insdustrials. 20) Guany de corrent agrupat. 21) Tensió agrupada.

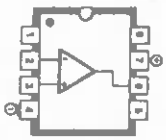
CONEXIONES DE LOS FET MÁS COMUNES

SIGLE	MOTOROLA	SILICONIX	NATIONAL	TEXAS	INTERSIL
BF244					
BF245					
2N3819					
2N5245					
2N5247					
2N5248					
MPF102					
U310					
2N5484					
2N5486					

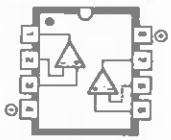
Debido a que los terminales G-S-D de los FET varían dependiendo del fabricante, consideramos útil representar la disposición relativa de los más comunes. Recordamos que el terminal al que hay que prestar una mayor atención es al GATE, porque siendo el fet un semiconductor bidireccional, el terminal S se podría usar como terminal D y viceversa.

Circuitos Integrados lineales

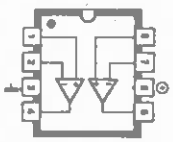




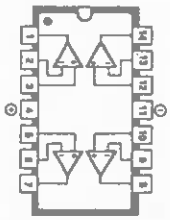
301
318
709
741
CA 3130
CA 3140
LF 355/356/357
TL 071/081



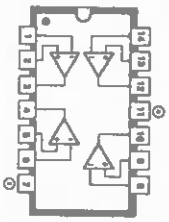
1458
4558



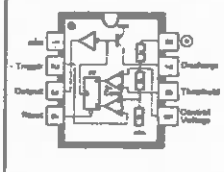
LM 387
NE 542



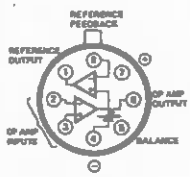
LM 324
TL 074
TL 084



RC 4136

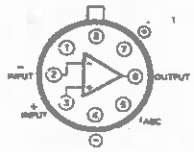


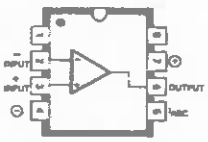
555



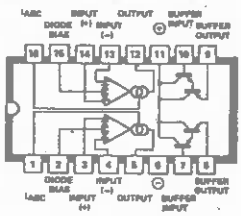
LM 10C

CA 3080





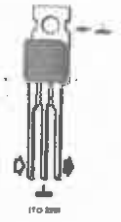
LM 13600



Entrada ⇨
Salida ⇦

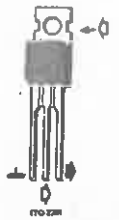
Todos los CIs se representan en vista superior

Reguladores de tensión



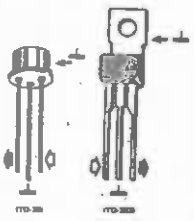
7805
7806
7808
7812
7815
7818
7824

I_{out} = 1 A



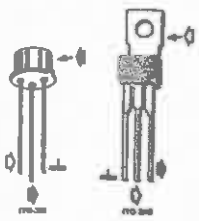
7905
7906
7908
7912
7915
7918
7924

I_{out} = −1 A



78M05
78M06
78M08
78M12
78M15
78M18
78M24

I_{out} = 500 mA

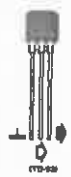


79M05
79M06
79M08
79M12
79M15
79M18
79M24

I_{out} = −500 mA

78L05
78L06
78L08
78L12
78L15
78L18
78L24

I_{out} = 100 mA



79L05
79L06
79L08
79L12
79L15
79L18
79L24

I_{out} = −100 mA

U_{out} = 5 V

LM 309K
I_{out} = 1 A

LM 323K
I_{out} = 3 A

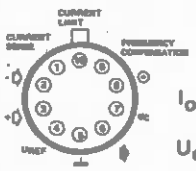
U_{out} = −5 V

I_{out} = −3 A

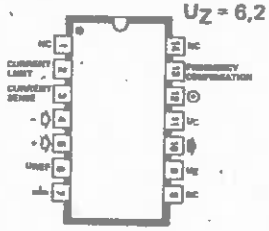
U_{out} = 1,2 V . . . 37 V

LM 317K
I_{out} = 1,5 A

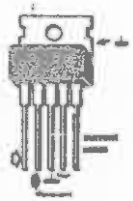
LM 723



I_{out} = 200 mA
U_{out} = . . . 37 $V_{max.}$
(pas de U_Z)
U_{ref} = 7,15 V
U_Z = 6,2 V



U_{out} = 2,85 V . . . 40 V



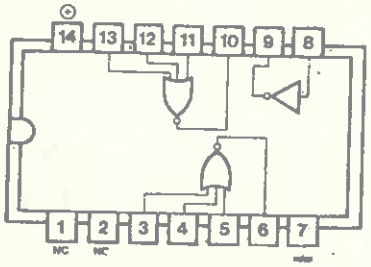
L 200
I_{out} = 2 A

Tensiones de entrada admisibles.

7805 = 8 V . . . 35 V	7905 = −8 V . . . −35 V
7806 = 9 V . . . 35 V	7906 = −9 V . . . −35 V
7808 = 11 V . . . 35 V	7908 = −11 V . . . −35 V
7812 = 15 V . . . 35 V	7912 = −15 V . . . −35 V
7815 = 18 V . . . 35 V	7915 = −18 V . . . −35 V
7818 = 21 V . . . 35 V	7918 = −21 V . . . −35 V
7824 = 27 V . . . 40 V	7924 = −27 V . . . −40 V

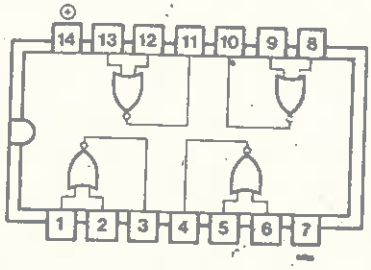
DUAL 3-INPUT NOR GATE PLUS INVERTER

4000



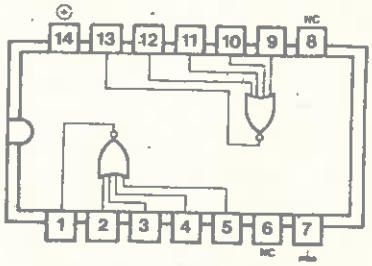
QUADRUPLE 2 INPUT NOR GATE

4001



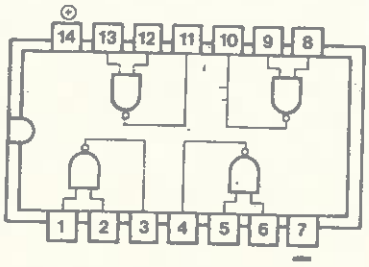
DUAL 4-INPUT NOR GATE

4002



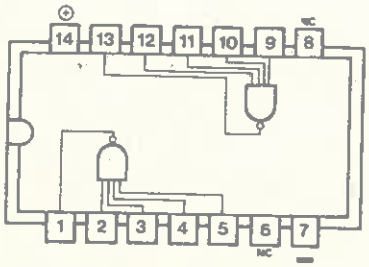
QUADRUPLE 2 INPUT NAND GATE

4011



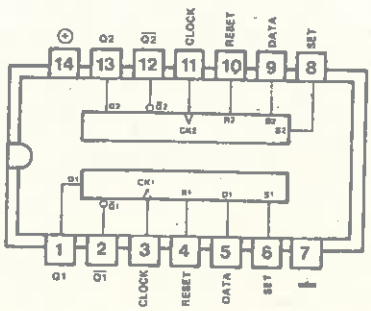
DUAL 4-INPUT NAND GATE

4012



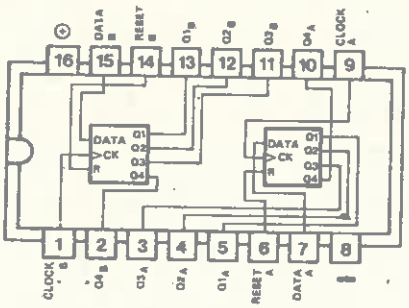
DUAL D-FLIP-FLOP

4013



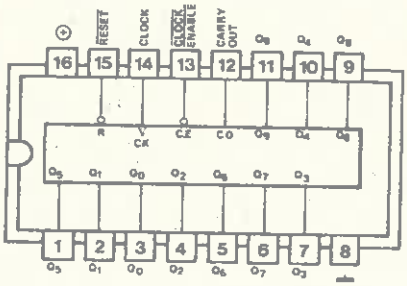
DUAL 4-BIT STATIC SHIFT REGISTER

4015



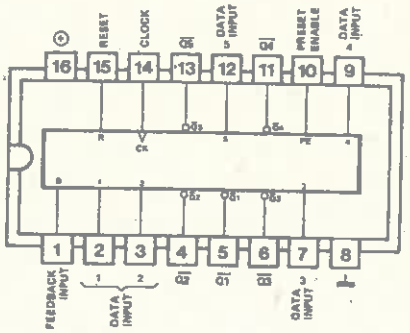
DIVIDE BY 10 SYNCHRONOUS COUNTER

4017



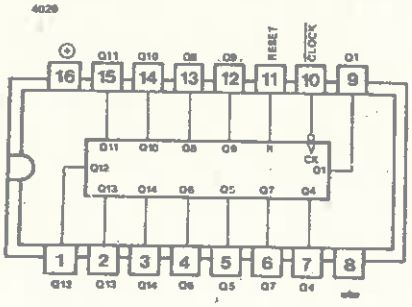
SYNCHRONOUS PRESETTABLE DIVIDE BY 'N' COUNTER

4018



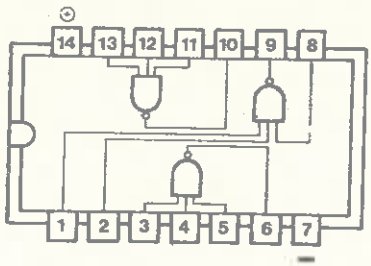
14-BIT BINARY RIPPLE COUNTER

4020



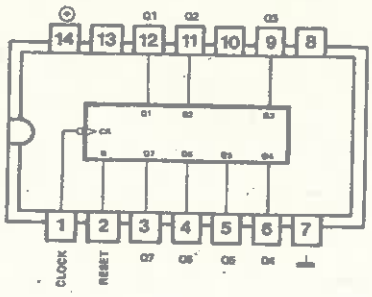
TRIPLE 3 INPUT NAND GATE

4023



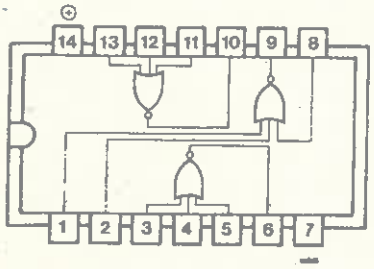
7-STAGE BINARY RIPPLE COUNTER

4024



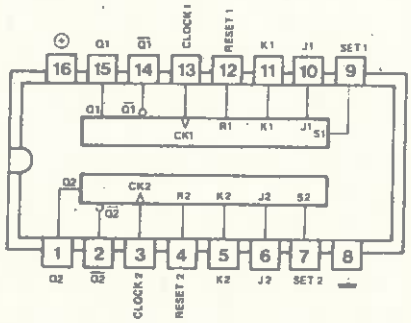
TRIPLE 3-INPUT NOR GATE

4025



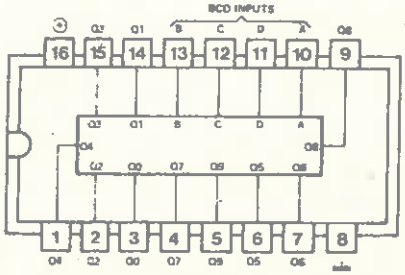
DUAL JK FLIP FLOP

4027



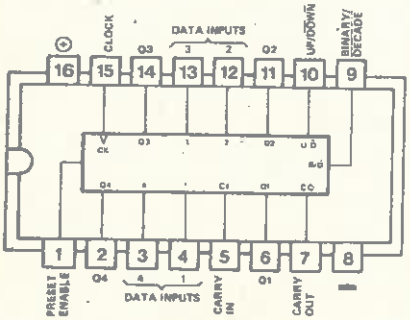
BCD TO DECIMAL DECODER

4028



SYNCHRONOUS PRESETTABLE BINARY/DECADE UP/DOWN COUNTER

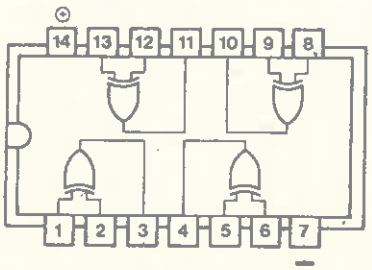
4029



QUADRUPLE 2 INPUT EXCLUSIVE OR GATES

4030

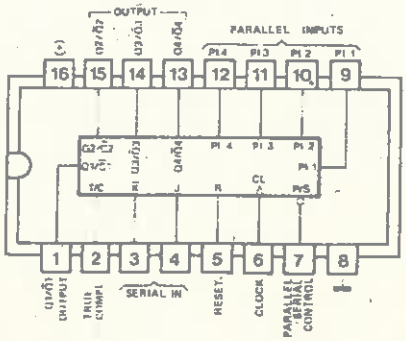
4070 low power TTL compatible (fan out = 2)



4035

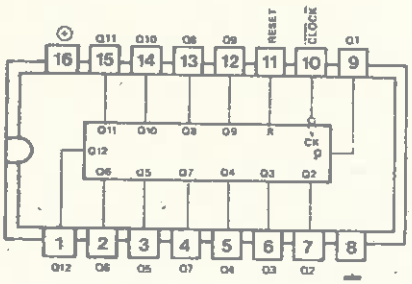
4 BIT

PARALLEL IN/PARALLEL OUT SHIFT REGISTER



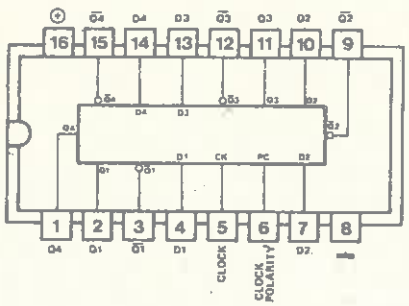
12 BIT BINARY RIPPLE COUNTER

4040



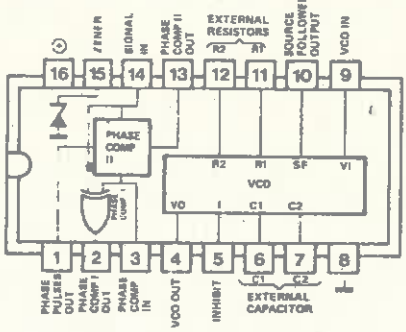
QUAD CLOCKED "D" LATCH

4042



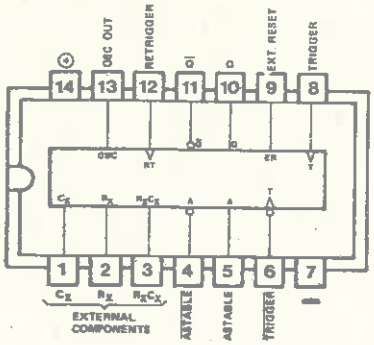
MICROPOWER PLL

4046



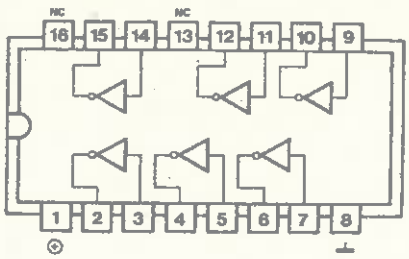
MONOSTABLE-ASTABLE MULTIVIBRATOR

4047



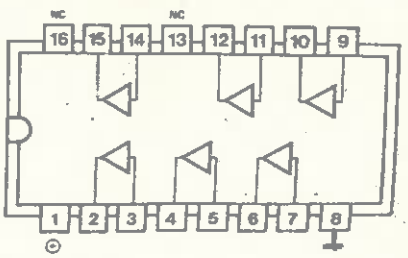
HEX INVERTING BUFFER

4049



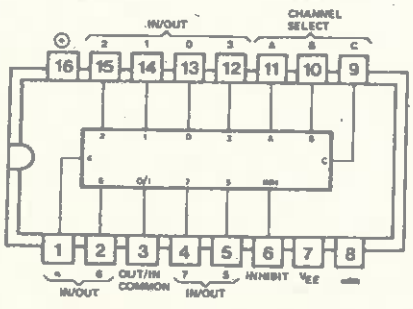
HEX BUFFER

4050



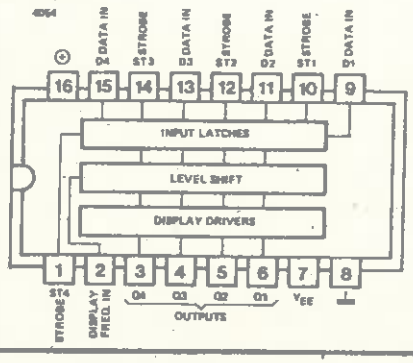
3 CHANNEL ANALOGUE MULTIPLEXER/DEMULTIPLEXER

4051



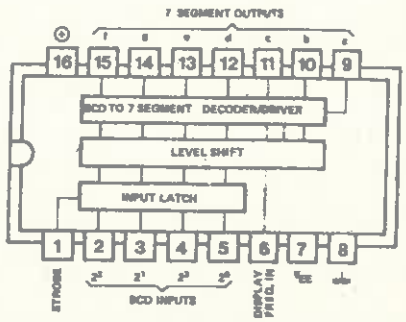
LCD-DRIVER

4054



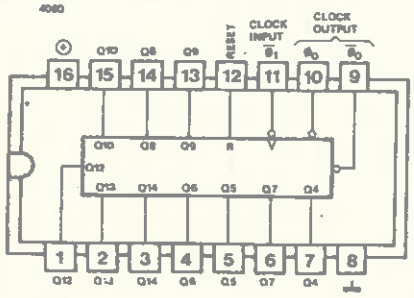
BCD TO 7-SEGMENT DECODER/DRIVER

4056



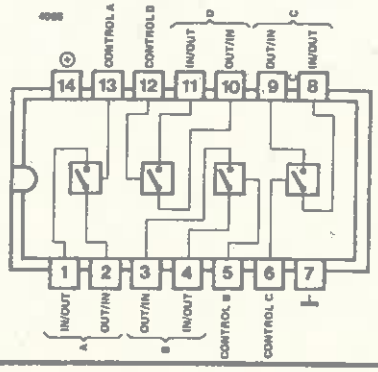
1 BIT BINARY RIPPLE COUNTER AND OSCILLATOR

4060



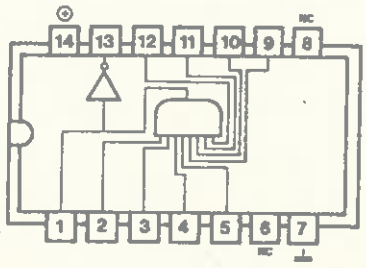
QUAD BILATERAL SWITCH

4066



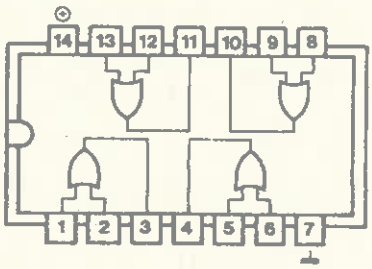
8 INPUT AND/NAND GATE

4068



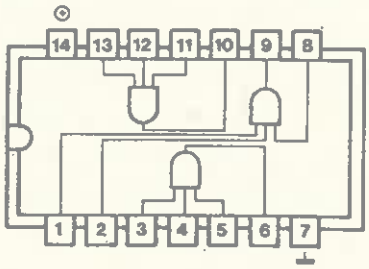
QUADRUPLE 2-INPUT OR-GATE

4071



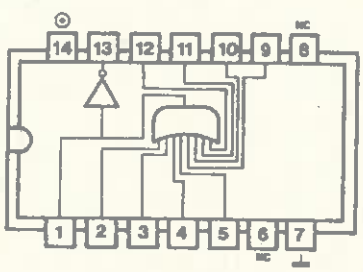
TRIPLE 3-INPUT AND GATE

4073



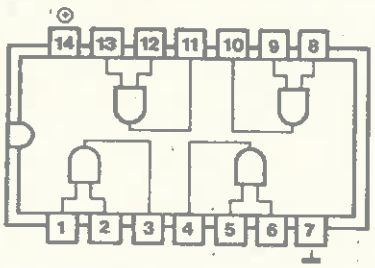
8 INPUT OR/NOR GATE

4078



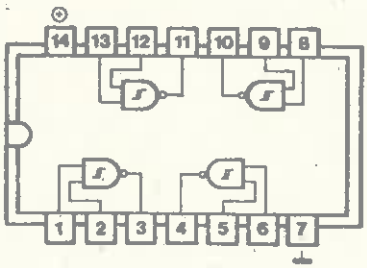
QUADRUPLE 2-INPUT AND-GATE

4081



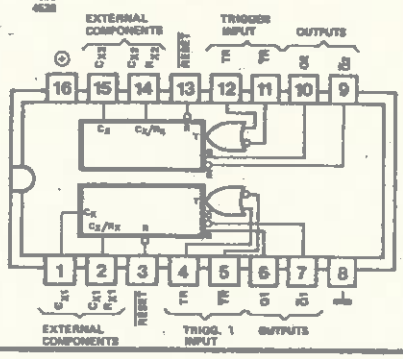
QUADRUPLE 2-INPUT NAND SCHMITT-TRIGGER

4093



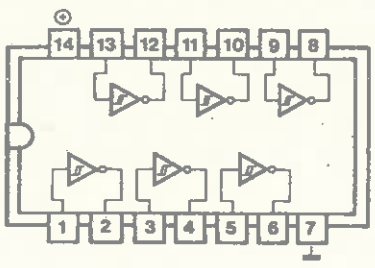
DUAL MONOSTABLE MULTIVIBRATOR

4098
4528



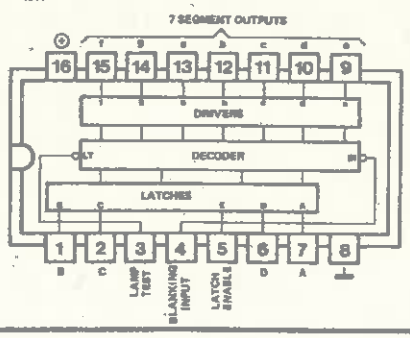
HEX SCHMITT-TRIGGER

40106



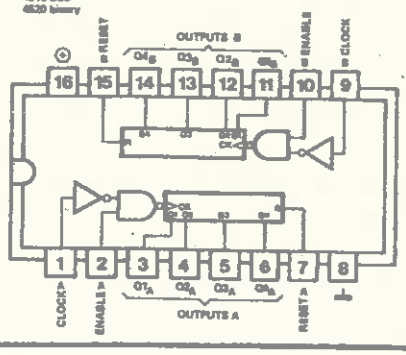
BCD TO 7-SEGMENT LATCH/DECODER/DRIVER

4511



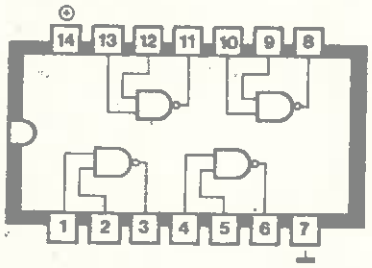
DUAL 4-BIT SYNCHRONOUS UP-COUNTERS

4518 BCD
4520 binary



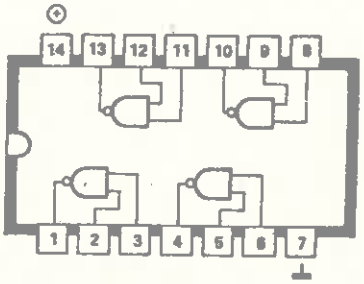
QUADRUPLE 2-INPUT NAND GATES

7400
7403 open collector outputs
7437 power driver (fan out = 30)



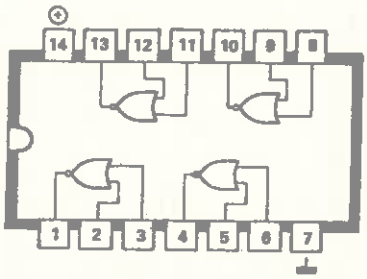
QUADRUPLE 2-INPUT NAND GATE WITH OPEN COLLECTOR OUTPUT

7401



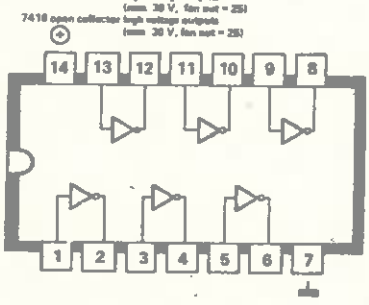
QUADRUPLE 2-INPUT NOR GATES

7402
7428 power driver (fan out = 30)



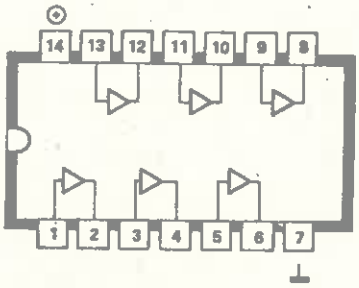
HEX INVERTERS

7404
7405 open collector outputs
7406 open collector high voltage outputs
(max. 30 V, fan out = 25)
7416 open collector high voltage outputs
(max. 30 V, fan out = 25)



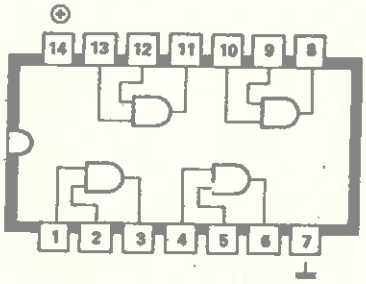
HEX BUFFER/DRIVER WITH OPEN-COLLECTOR HIGH VOLTAGE OUTPUTS (max. 30 V, fan out = 25)

7407



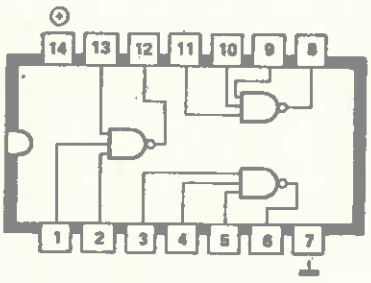
QUADRUPLE 2-INPUT AND GATES

7408
7409 open collector outputs



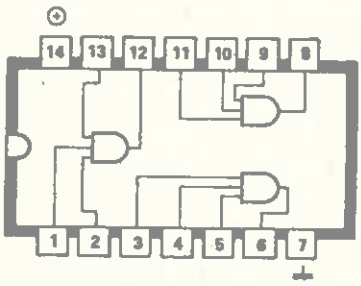
TRIPLE 3-INPUT NAND GATES

7410
7412 open collector outputs



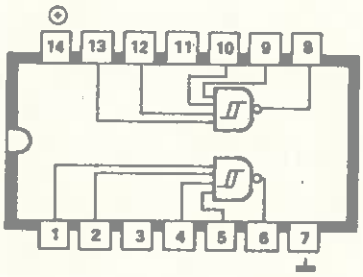
TRIPLE 3-INPUT AND GATE

7411



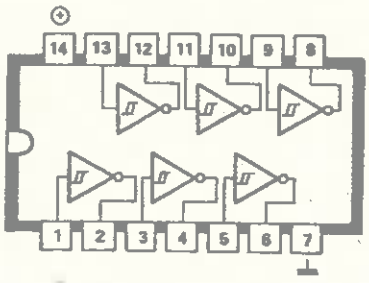
DUAL 4-INPUT NAND SCHMITT TRIGGER

7413



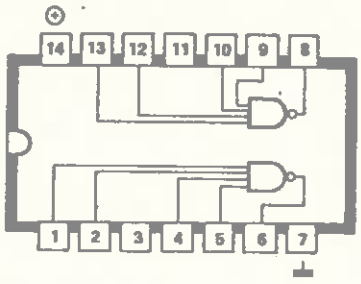
HEX SCHMITT TRIGGER INVERTER

7414



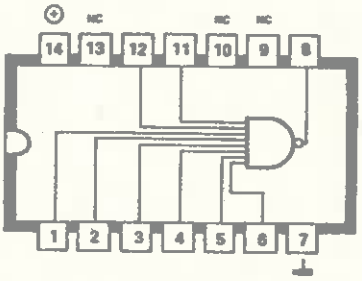
DUAL 4-INPUT NAND GATES

7420
7440 power driver (fan out = 30)



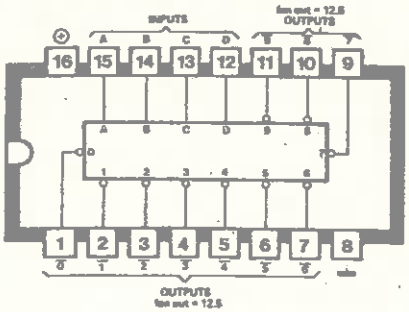
8 INPUT NAND GATE

7430



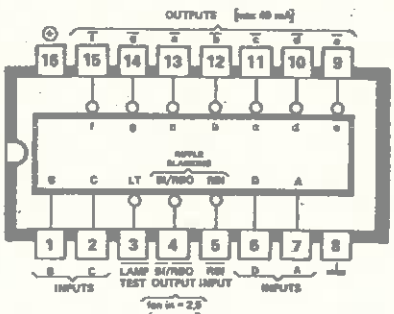
BCD-TO-DECIMAL DECODER/DRIVER WITH OPEN COLLECTOR OUTPUTS (max. 30 V)

7445



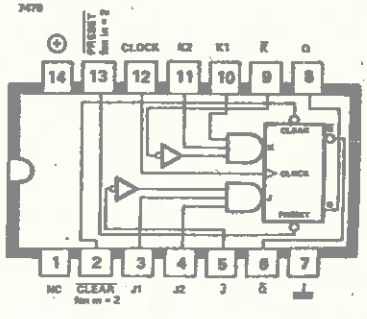
BCD TO 7 SEGMENT DECODER/DRIVER

7447



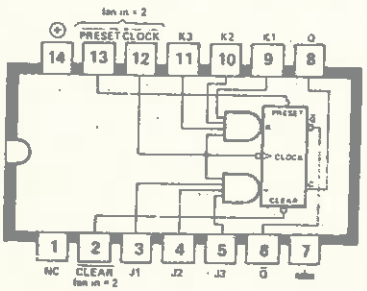
AND GATED J-K POSITIVE EDGE-TRIGGERED FLIP-FLOP WITH PRESET AND CLEAR

7476



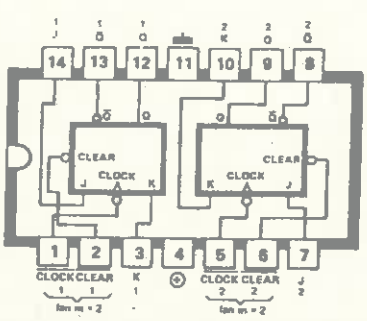
AND GATED J K FLIP FLOP WITH PRESET AND CLEAR

7472



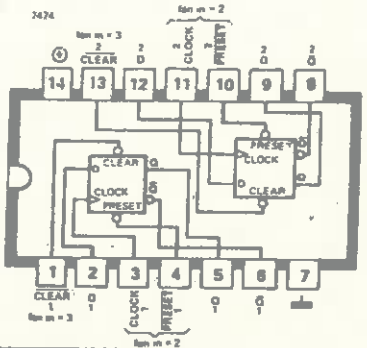
DUAL J K FLIP FLOP WITH CLEAR

7473



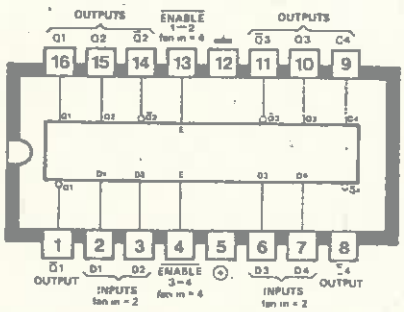
DUAL D TYPE POSITIVE EDGE TRIGGERED FLIP FLOP WITH PRESET AND CLEAR

7474



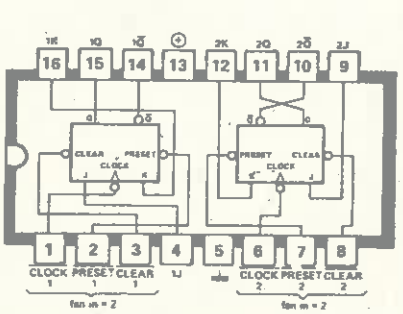
4-BIT BISTABLE LATCH

7475



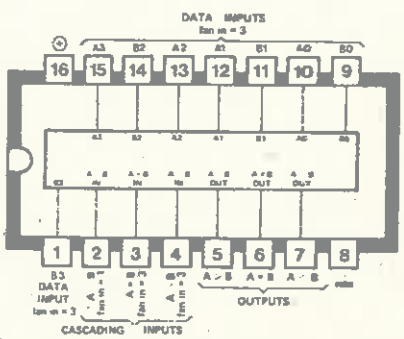
DUAL J K MASTER SLAVE FLIP-FLOP WITH PRESET AND CLEAR

7476



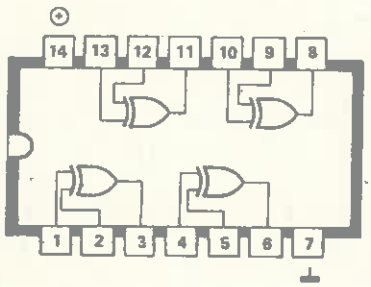
4-BIT COMPARATOR

7485



QUADRUPLE 2 INPUT EXCLUSIVE OR GATE

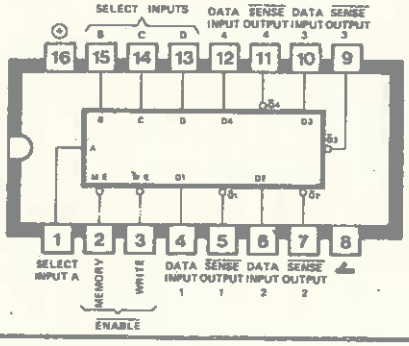
7486



64 BIT READ/WRITE MEMORY

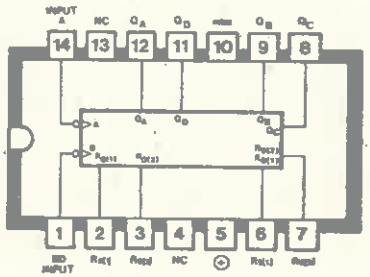
(fan out = 7.5)

7489



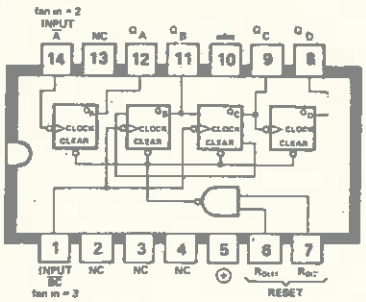
DECADE COUNTER

7490



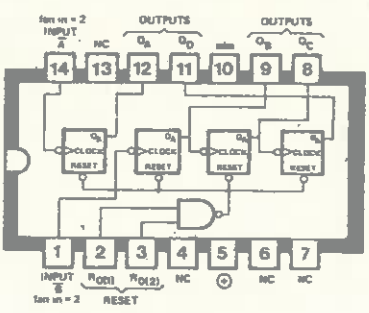
DIVIDE-BY TWELVE COUNTER (2 and 6)

7492



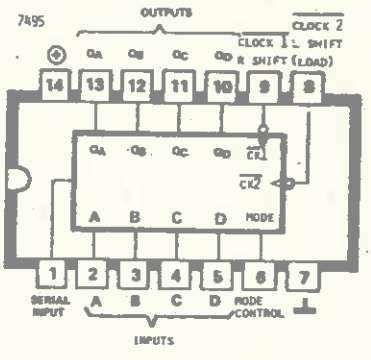
4 BIT BINARY COUNTER

7493



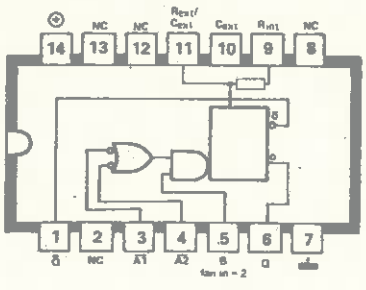
4-BIT PARALLEL-IN PARALLEL-OUT SHIFT REGISTER

7495



MONOSTABLE MULTIVIBRATOR

74121

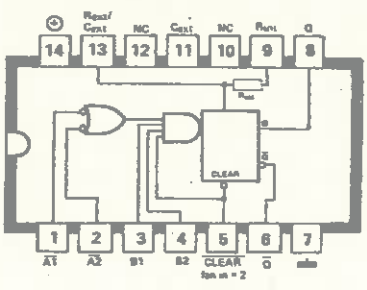


'121 ... R_{int} = 2 k... NOM.

'L121 ... R_{int} = 4 k... NOM

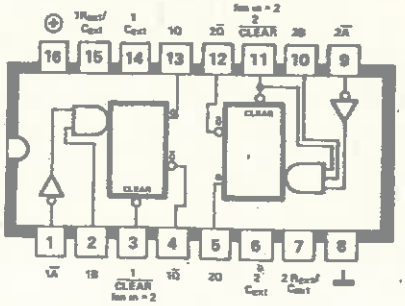
RETRIGGERABLE MONOSTABLE MULTIVIBRATOR WITH CLEAR

74122



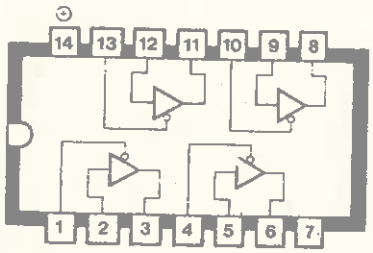
DUAL RETRIGGERABLE MONOSTABLE MULTIVIBRATOR WITH CLEAR

74123



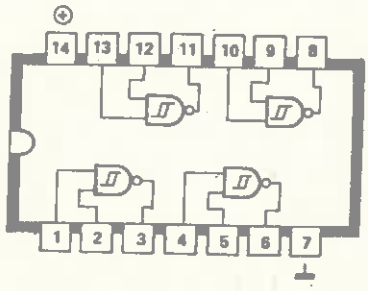
QUAD BUFFER (3-STATE)

74125



QUADRUPLE 2 INPUT NAND SCHMITT TRIGGER

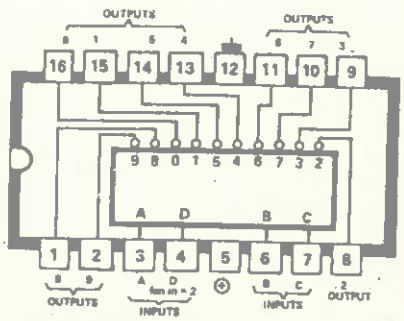
74132



BCD TO DECIMAL DECODER/DRIVER

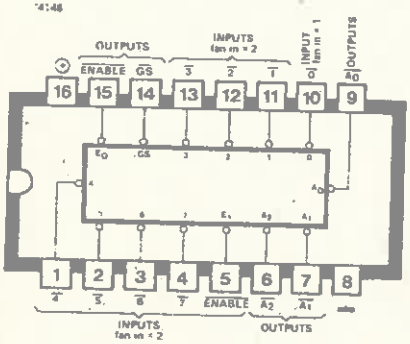
(outputs max. 60 V, max. 7 mA)

74141



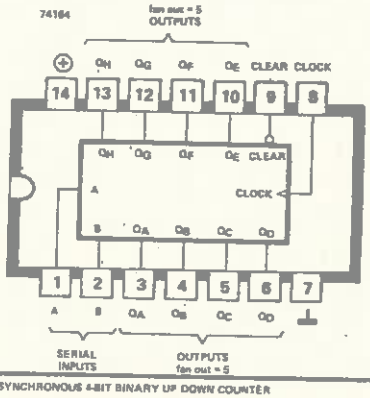
PRIORITY ENCODER

74148



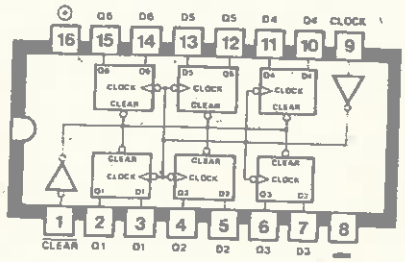
8-BIT SERIAL-IN PARALLEL-OUT SHIFT REGISTER

74164



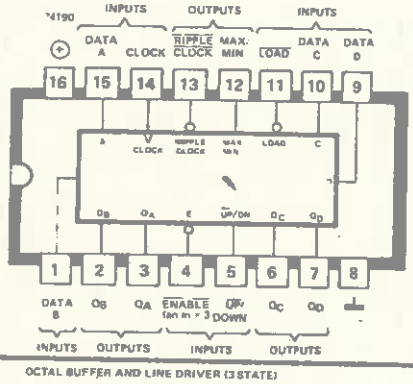
HEX D FLIP-FLOP WITH CLEAR

74174



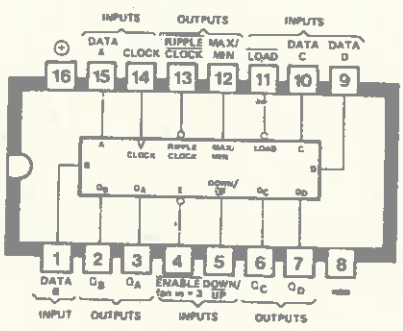
SYNCHRONOUS BCD UP DOWN COUNTER WITH UP DOWN MODE CONTROL

74190



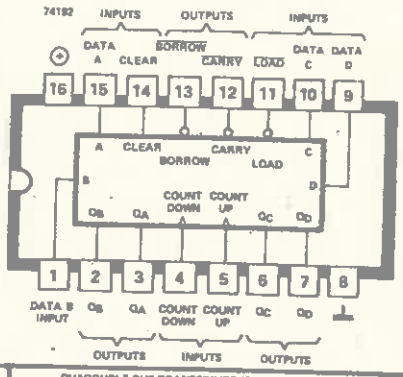
SYNCHRONOUS 4-BIT BINARY UP DOWN COUNTER

74191



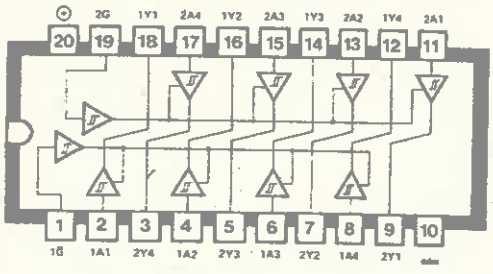
SYNCHRONOUS UP/DOWN DECADE COUNTER

74192



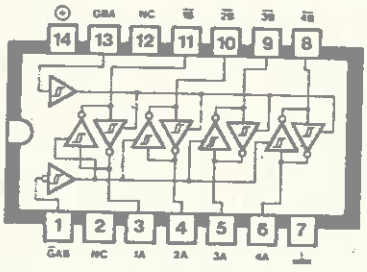
OCTAL BUFFER AND LINE DRIVER (3-STATE)

74LS241



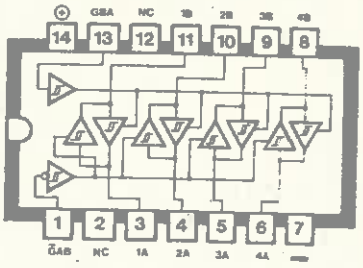
QUADRUPLE BUS TRANSCEIVER (3-STATE)

74LS242



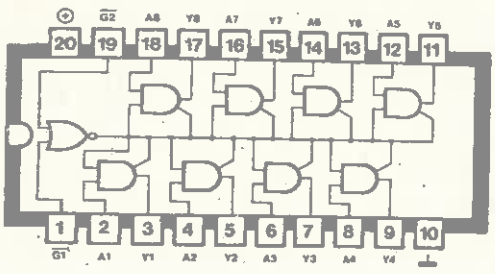
QUADRUPLE BUS TRANSCEIVER (3-STATE)

74LS243



OCTAL BUFFER (3-STATE)

81LS95



OCTAL BUFFER (3-STATE)

81LS97

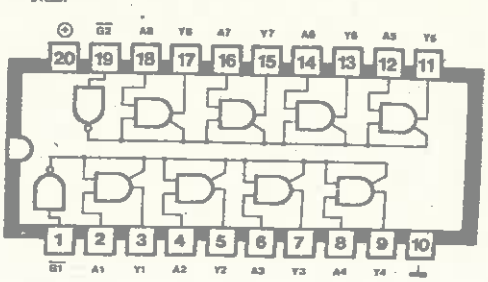


TABLE 4.1. OPERATIONAL AMPLIFIERS

Type	Mfg[a]	# per pkg[b] 1 2 4	Trim	Ext comp[c]	Min gain[d]	Total supply voltage min (V)	Total supply voltage max (V)	Supp curr max (mA)	Voltage: Offset typ (mV)	Voltage: Offset max (mV)	Voltage: Drift typ (µV/°C)	Voltage: Drift max (µV/°C)	Current: Bias max (nA)	Current: Offset max (nA)	e_n @1kH typ nV/√H
BIPOLAR, PRECISION															
OP-07A	PM+	• A –	•	–	1	6	44	4	0.01	0.025	0.2	0.6	2	2	9.6
OP-07E	PM+	• A –	•	–	1	6	44	4	0.03	0.08	0.3	1.3	4	3.8	9.6
OP-21A	PM	• A A	•	–	1	5	36	0.3	0.04	0.1	0.5	1	100	4	21
OP-27E	PM+	• A A	•	–	1	8	44	5	0.01	0.025	0.2	0.6	40	35	3.0
OP-27G	PM+	• A A	•	–	1	8	44	6	0.03	0.1	0.4	1.8	80	75	3.2
OP-37E	PM+	• A –	•	–	5	8	44	5	0.01	0.025	0.2	0.6	40	35	3.0
OP-50E	PM	• – –	•	•	5	10	36	4	0.01	0.025	0.15	0.3	5	1	4.5
OP-77E	PM	• A A	•	–	1	6	44	2	0.01	0.025	0.1	0.3	2	1.5	9.6
OP-90E	PM	• A A	•	–	1	1.6	36	0.02	0.05	0.15	0.3	2	15	3	60
OP-97E	PM	• – –	•	–	1	4.5	40	0.6	0.01	0.025	0.2	0.6	0.1	0.1	14
MAX400M	MA	• – –	•	–	1	6	44	4	0.004	0.01	0.2	0.3	2	2	9.6
LM607A	NS	• – –	•	•	1	6	44	1.5	0.015	0.025	0.2	0.3	2	2	6.5
AD707C	AD	• A –	•	–	1	6	36	3	0.005	0.015	0.03	0.1	1	1	9.6
AD846B	AD	• – –	–	•	2	10	36	6.5	0.025	0.075	0.8	3.5	250	(k)	2
LT1001A	LT	• A –	•	–	1	6	44	3.3	0.01	0.025	0.2	0.6	4	4	9.6
LT1007A	LT	• – –	•	–	1	5	44	4	0.01	0.025	0.2	0.6	35	30	2.5
LT1012C	LT+	• A –	•	•	1	4	40	0.6	0.01	0.05	0.2	1.5	0.15	0.15	14
LT1028A	LT	• – –	•	•	1	8	44	9.5	0.01	0.04	0.2	0.8	90	50	0.9
LT1037A	LT	• – –	•	–	5	5	44	4.5	0.01	0.025	0.2	0.6	35	30	2.5
RC4077A	RA	• – –	•	–	1	6	44	1.7	0.004	0.01	0.1	0.3	2	1.5	9.6
HA5134A	HA	– – •	–	–	1	10	40	8	0.05	0.1	0.3	1.2	25	25	7
HA5135	HA	• – –	•	–	1	8	40	1.7	0.01	0.08	0.4	1.3	4	4	9
HA5147A	HA	• – –	•	–	10	8	44	4	0.01	0.025	0.2	0.6	40	35	3.0
BIPOLAR, LOW-BIAS (see also "bipolar, precision")															
OP-08E	PM	• – –	–	•	U	10	40	0.5	0.07	0.15	0.5	2.5	2	0.2	20
LM10	NS+	• – –	•	–	1	1	45	0.4	0.3	2	2	-	20	0.7	47
LM11	NS+	• – –	•	•	1	5	40	0.6	0.1	0.3	1	3	50pA	10pA	150
OP-12E	PM+	• – –	–	–	1	10	40	0.5	0.07	0.15	0.5	2.5	2	0.2	20
LM308	NS+	• A –	–	•	U	10	36	0.8	2	7.5	6	30	7	1	35
LM312	NS+	• – –	•	•	1	10	40	0.8	2	7.5	6	30	7	1	35
LP324	NS	– – •	–	–	1	4	32	0.25	2	4	10	-	10	2	-
BIPOLAR, SINGLE-SUPPLY															
324A	NS+	A A •	–	–	1	3	32	3	2	3	7	30	100	30	-
LP324	NS	– – •	–	–	1	4	32	0.25	2	4	10	-	10	2	-
LT1013C	LT	– • A	–	–	1	4	44	1	0.06	0.3	0.4	2.5	50	2	22
HA5141A	HA	• A A	–	–	1	2	40	0.07	0.5	2	3	-	75	10	20
BIPOLAR, SINGLE-SUPPLY PRECISION															
LT1006A	LT	• – –	•	–	1	2.7	44	0.5	0.02	0.05	0.2	1.3	15	0.5	22
LT1013A	LT	– • A	–	–	1	4	44	1	0.04	0.15	0.4	2	35	1.3	22

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e_n @1kHz typ nV/√Hz	Type	Slew rate[e] typ (V/µs)	f_T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input[f] (V)	Swing to supplies?[g] In +	In −	Out +	Out −	Comments
9.6	OP-07A	0.17	0.6	110	100	110	10	30[h]	–	–	–	–	
9.6	OP-07E	0.17	0.6	106	94	106	10	30[h]	–	–	–	–	
21	OP-21A	0.25	0.6	100	104	120	-	30	–	–	–	–	low power
3.0	OP-27E	2.8	8	114	100	120	20	0.5	–	–	–	–	low noise
3.2	OP-27G	2.8	8	100	94	117	20	0.5	–	–	–	–	cheap grade
3.0	OP-37E	17	63	114	100	120	20	0.5	–	–	–	–	low noise, decomp OP-27
4.5	OP-50E	3	25	126	126	140	70	10[h]	–	–	–	–	high current, low noise
9.6	OP-77E	0.3	0.6	120	110	134	12	30[h]	–	–	–	–	improved OP-07
60	OP-90E	0.01	0.02	100	104	117	6	36	–	•	–	•	micropower
14	OP-97E	0.2	0.9	114	114	110	10	0.5	–	–	–	–	low power OP-77
9.6	MAX400M	0.3	0.6	114	100	114	12	30	–	–	–	–	lowest non-chopper V_{os}
6.5	LM607A	0.7	1.8	124	100	134	10	0.5	–	–	–	–	
9.6	AD707C	0.3	0.9	130	120	138	12	44	–	–	–	–	improved OP-07; dual = 708
2	AD846B	450	310	110	110	-	50	18	–	–	–	–	current feedback; fast
9.6	LT1001A	0.25	0.8	114	110	113	30	30	–	–	–	–	
2.5	LT1007A	2.5	8	117	110	137	20	0.5	–	–	–	–	low noise, ~OP-27
14	LT1012C	0.2	0.8	110	110	106	12	1	–	–	–	–	improved 312; dual = 1024
0.9	LT1028A	15	75	114	117	137	20	1	–	–	–	–	ultra low noise
2.5	LT1037A	15	60	117	110	137	20	0.5	–	–	–	–	decomp 1007, ~OP-37
9.6	RC4077A	0.25	0.8	120	110	128	15	30	–	–	–	–	lowest non-chopper V_{os}
7	HA5134A	1	4	94	100	108	20	40	–	–	–	–	quad, low noise
9	HA5135	0.8	2.5	106	94	120	20	15[h]	–	–	–	–	
3.0	HA5147A	35	140	114	80	120	15	0.5	–	–	–	–	low noise, high speed, uncomp
20	OP-08E	0.12	0.8	104	104	98	5	0.5	–	–	–	–	precision 308
47	LM10	0.12	0.1	93	90	102	20	40	–	•	•	•	1V op-amp; precision; volt. ref.
150	LM11	0.3	0.5	110	100	100	2	0.5	–	–	–	–	precision; lowest bias bipolar
20	OP-12E	0.12	0.8	104	104	98	5	0.5	–	–	–	–	precision 312
35	LM308	0.15	0.3	80	80	88	5	0.5	–	–	–	–	original low-bias (superbeta)
35	LM312	0.15	0.3	80	96	88	5	0.5	–	–	–	–	compensated 308
-	LP324	0.05	0.1	80	90[t]	94	5	32	–	•	–	•	low power, single supply
-	324A	0.5	1	65	65	88	20	30	–	•	–	•	a classic; dual=358A
-	LP324	0.05	0.1	80	90[t]	94	5	32	–	•	–	•	low power, low bias
22	LT1013C	0.4	0.8	97	100	122	25	30	–	•	–	•	improved 358/324; quad = 1014
20	HA5141A	1.5	0.4	80	94	94	1	7	–	•	–	•	micropower
22	LT1006A	0.4	1	100	106	120	20	30	–	•	–	•	optional I_s = 90µA
22	LT1013A	0.4	0.8	100	103	124	25	30	–	•	–	•	improved 358/324; quad = 1014

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TABLE 4.1 (*cont'd*)

Type	Mfg[a]	# per pkg[b] 1	2	4	Trim	Ext comp[c]	Min gain[d]	Total supply voltage min (V)	max (V)	Supp curr max (mA)	Voltage: Offset typ (mV)	Offset max (mV)	Drift typ (μV/°C)	Drift max (μV/°C)	Current: Bias max (nA	Offset max (nA)	e_n @1kHz typ nV/√Hz
BIPOLAR, HIGH-SPEED																	
OP-62E	PM	•	–	–	•	•	1	16	36	7	-	0.2	-	-	300	100	2.5
OP-63E	PM	•	–	–	•	•	1	16	36	7	-	0.75	-	-	300	100	7
OP-64E	PM	•	–	–	•	•	5	16	36	7	-	0.75	-	-	300	100	7
OP-65E	PM	•	–	–	•	–	1	9	14	25	-	2	-	-	3μA	1μA	-
CLC400	CL	•	–	–	•	–	1	-	7	15	2	5.5	20	40	25μA	(k)	12
AD509K	AD	•	–	–	•	•	3	10	40	6	4	8	-	40	200	25	19
SL541B	PL	•	–	–	•	–	10	-	24	21	-	5	15	-	25μA	10	-
VA705L	VT	•	A	A	•	–	1	8	12	10	1	2	20	-	900	25	-
VA706K	VT	•	A	A	•	–	1	8	12	10	4	10	20	-	1μA	120	-
VA707K	VT	•	A	A	•	–	12	8	12	10	3	6	20	-	1μA	120	-
LM837	NS	–	–	•	–	–	1	8	36	15	0.3	5	2	-	1μA	200	4.5
AD840K	AD	•	–	–	•	–	10	10	36	12	0.1	0.3	3	-	5μA	200	4
AD841K	AD	•	–	–	•	–	1	10	36	12	0.5	1	35	20	5μA	200	13
AD847J	AD	•	–	–	•	–	1	9	36	5.6	0.5	1	15	-	7μA	50[f]	15[i]
AD848J	AD	•	–	–	•	–	5	9	36	5.6	0.5	1	2	10	5μA	15[f]	4[i]
AD849J	AD	•	–	–	•	–	25	9	36	5.6	0.5	1	1	10	5μA	15[f]	4[i]
HA2539	HA	•	–	–	–	–	10	10	35	25	8	15	20	-	20μA	6μA	6
SL2541B	PL	•	–	–	•	–	1	14	30	25[f]	10	-	20	-	20μA	-	-
HA2541	HA	•	–	–	•	–	1	10	35	45	-	2	20	-	35μA	7μA	10
HA2542	HA	•	–	–	•	•	2	10	35	40	-	10	20	-	35μA	7μA	10
HA2544	HA	•	–	–	•	•	1	10	33	10	6	15	10	-	15μA	2μA	-
CA3450	RC	•	–	–	•	•	1	10	14	35	8	15	-	-	350	150	-
HA5101	HA	•	A	A	•	–	1	4	40	6	0.5	3	3	-	200	75	3.3
HA5111	HA	•	A	A	•	•	10	4	40	6	0.5	3	3	-	200	75	3.3
HA5147A	HA	•	–	–	•	–	10	8	44	4	0.01	0.025	0.2	0.6	40	35	3.0
HA5195	HA	•	–	–	–	–	5	20	35	25	3	6	20	-	15μA	4μA	6
LM6361	NS	•	–	–	•	–	1	5	36	6.5	5	20	10	-	5μA	2μA	15
LM6364	NS	•	–	–	•	–	5	5	36	6.5	2	9	6	-	5μA	2μA	8
LM6365	NS	•	–	–	•	–	25	5	36	6.8	1	6	3	-	5μA	2μA	5
BIPOLAR, OTHER																	
OP-20B	PM	•	A	A	•	–	1	4	36	0.08	0.06	0.25	0.75	1.5	25	1.5	58
LM833	NS	–	•	–	–	–	1	10	36	8	0.3	5	2	-	1μA	200	4.5
CA3193A	RC	•	–	–	•	–	1	7	36	3.5	0.14	0.2	1	3	20	5	24
XR4560	XR	–	•	–	–	–	1	8	36	2	0.5	6	-	-	500	200	8
HA5151	HA	•	A	A	–	–	1	2	40	0.25	2	3	3	-	150	30	15
NE5534	SN+	•	A	–	•	•	3	6	44	8	0.5	4	-	-	2μA	300	4
MC33078	MO	–	•	A	–	–	1	10	36	5	0.15	2	2	-	750	150	4.5
MC33171	MO	•	A	A	•	–	1	3	44	0.25	2	4.5	10	-	100	20	32
MC34071A	MO	•	A	A	•	–	1	3	44	2.5	0.5	1.5	10	-	500	50	32

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e_n typ kHz	e_n typ √Hz	Type	Slew rate[e] typ (V/µs)	f_T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input[f] (V)	Swing to supplies?[g] In +	In −	Out +	Out −	Comments
	2.5	OP-62E	15	50	110	105	111	20	5	–	–	–	–	precision
		OP-63E	50	50	110	105	100	20	5	–	–	–	–	
		OP-64E	200	200	110	105	100	20	5	–	–	–	–	
		OP-65E	200	150	85	90	100	50	5	–	–	–	–	
	2	CLC400	700	280	40	40	-	50	-	–	–	–	–	transimpedance; decomp=401
	9	AD509K	120	20	80	80	80	-	15	–	–	–	–	fast
		SL541B	175	100	60	46	46	6.5	9	–	–	–	–	fast, video
		VA705L	35	25	60	60	80	50	9	–	–	–	–	video, drives 50Ω; fast settle
		VA706K	42	25	60	60	66	50	9	–	–	–	–	video, drives 50Ω; fast settle
		VA707K	105	300	60	60	74	50	9	–	–	–	–	decomp, fast, 50Ω
	4.5	LM837	10	25	80	120	90	40	30	–	–	–	–	low noise, low distortion
	4	AD840K	400	400	100	94	104	50	6	–	–	–	–	decomp 841; 842 has G>2
	3	AD841K	300	40	90	90	88	50	6	–	–	–	–	fast settle; decomp versions
	5[i]	AD847J	300	50	78	75	70	20	6	–	–	–	–	fast settle; decomp versions
	4[i]	AD848J	300	250	104[t]	104[t]	82	25	6	–	–	–	–	decomp 847
	4[i]	AD849J	300	725	110[t]	100[t]	90	25	6	–	–	–	–	uncomp 847
	6	HA2539	600	600	60	85	80	10	6	–	–	–	–	low noise, sim to 2540
	-	SL2541B	900	800	47	40[t]	45	10	10	–	–	–	–	has uncommitted unity gain buf
	10	HA2541	280	40	70	60	80	10	6	–	–	–	–	fast settle, low distortion
	10	HA2542	375	120	70	70	80	100	6	–	–	–	–	fast settle, decomp
		HA2544	150	33	75	70	70	35	6	–	–	–	–	video
		CA3450	420	190	50	60	96	75	5	–	–	–	–	video amp/line driver
	3.3	HA5101	10	10	100[t]	80	136[t]	30	7	–	–	–	–	low noise
	3.3	HA5111	50	100	100[t]	100[t]	136[t]	30	7	–	–	–	–	low noise, uncomp
	3.0	HA5147A	35	140	114	80	120	15	0.7	–	–	–	–	low noise, precision, uncomp
	6	HA5195	200	150	74	70	80	25	6	–	–	–	–	Elantec EL2195 = improved
	15	LM6361	300	50	70	72	52	30	8	–	–	–	–	vertical PNP
		LM6364	300	160	102[t]	70	66[t]	30	8	–	–	–	–	vertical PNP
	5	LM6365	300	725	80	104[t]	75	30	8	–	–	–	–	vertical PNP
	58	OP-20B	0.05	0.1	96	100	114	0.5	30	–	•	–	–	accurate low power
	4.5	LM833	7	15	80	80	90	10	30	–	–	–	–	low noise, low distortion
	24	CA3193A	0.25	1.2	110	100	110	7	5	–	–	–	–	
	8	XR4560	4	10	70	76	86	100	30	–	–	–	–	intended for audio
	15	HA5151	4.5	1.3	80	80	94	3	7	–	–	–	•	low power
	4	NE5534	6	10	70	80	88	20	0.5	–	–	–	–	low noise, intended for audio
	4.5	MC33078	7	16	80	80	90	20	36	–	–	–	–	low noise, low distortion
	32	MC33171	2.1	1.8	80	80	94	4	44	–	•	–	–	
	32	MC34071A	10	4.5	80	80	94	25	44	–	•	–	–	drives 0,01µF

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TABLE 4.1 (*cont'd*)

Type	Mfg[a]	# per pkg[b] 1	2	4	Trim	Ext comp[c]	Min gain[d]	Total supply voltage min (V)	Total supply voltage max (V)	Supp curr max (mA)	Voltage Offset typ (mV)	Voltage Offset max (mV)	Voltage Drift typ (μV/°C)	Voltage Drift max (μV/°C)	Current Bias max (nA)	Current Offset max (nA)	e_n @1kHz typ nV/√Hz
BIPOLAR, OBSOLESCENT																	
OP-01E	PM	•	–	–	•	–	1	10	44	3	1	2	3	10	50	5	-
OP-02E	PM	•	A	–	•	–	1	10	44	2	0.3	0.5	2	8	30	2	21
OP-05E	PM+	•	A	–	•	–	1	6	44	4	0.2	0.5	0.7	2	4	3.8	9.6
OP-11E	PM	–	–	•	–	–	1	10	44	6	0.3	0.5	2	10	300	20	12
307	NS+	•	–	–	–	–	1	10	44	2.5	2	7.5	6	30	250	50	16
LM318	NS+	•	–	–	•	•	1	10	40	10	4	10	-	-	500	200	14
349	NS	–	–	•	–	–	5	10	36	4.5	1	6	-	-	200	50	60
AD517L	AD	•	–	–	•	–	1	10	36	3	-	0.025	-	0.5	1	0.25	20
AD518J	AD	•	–	–	•	•	1	10	40	10	4	10	10	-	500	200	-
NE530	SN	•	A	–	•	–	1	10	36	3	2	5	6	-	150	40	30
NE531	SN	•	–	–	•	•	U	12	44	10	2	6	-	-	2μA	200	-
NE538	SN	•	A	–	•	–	5	10	36	2.8	2	5	6	-	150	40	18
μA725	FA+	•	–	–	•	•	U	6	44	3	0.5	1	2	5	100	20	-
μA739	FA	–	•	–	–	•	U	8	36	14	1	6	-	-	2μA	10μA	-
741C	FA+	•	A	A	•	–	1	10	36	2.8	2	6	-	-	500	200	-
748C	FA+	•	–	–	•	•	U	10	36	3.3	2	6	-	-	500	200	-
μA749	FA	–	•	–	–	•	U	8	36	10	1	3	3	-	750	400	-
1435	TP	•	–	–	•	•	10	24	32	30	2	5	5	25	20μA	-	-
1456	MO	•	–	–	•	–	1	10	36	3	5	10	-	-	30	10	45
HA2505	HA	•	–	–	•	•	1	20	40	6	4	8	20	-	250	50	-
HA2515	HA	•	–	–	•	•	1	20	40	6	5	10	30	-	250	50	-
HA2525	HA	•	–	–	•	•	3	20	40	6	5	10	30	-	250	50	-
HA2605	HA	•	–	–	•	•	1	10	45	4	3	5	10	-	25	25	-
HA2625	HA	•	–	–	•	•	5	10	45	4	3	5	10	-	25	25	-
CA3100	RC	•	–	–	•	•	10	13	36	11	1	5	-	-	2μA	400	-
4558	RA+	–	•	–	–	–	1	8	36	5.6	2	6	-	-	500	200	43
NE5535	SN	A	•	–	•	–	1	10	36	2.8	2	5	6	-	150	40	17
5539	SI+	•	–	–	–	•	7	6	24	15	2.5	5	5	10	20μA	-	4
JFET, PRECISION																	
OP-41E	PM	•	–	–	•	–	1	10	36	1	0.2	0.25	2.5	5	0.005	0.001	32
OP-43E	PM	•	–	–	•	–	1	10	36	1	0.2	0.25	2.5	5	0.005	0.001	32
OPA101B	BB	•	–	–	•	–	1	10	40	8	0.05	0.25	3	5	0.01	4pA	8
OPA111B	BB	•	A	–	•	–	1	10	36	3.5	0.05	0.25	0.5	1	1pA	0.7pA	7
AD547L	AD	•	A	–	•	–	1	5	36	1.5	-	0.25	-	1	0.025	2pA[f]	30
AD548C	AD	•	A	–	•	–	1	9	36	0.2	0.1	0.25	-	2	0.01	0.005	30
OPA627B	BB	•	–	–	•	–	1	9	36	8	0.04	0.1	0.5	0.8	0.02	0.02	5.2
AD711C	AD	•	A	A	•	–	1	9	36	2.8	0.1	0.25	2	3	0.025	0.01	18
AD845K	AD	•	–	–	•	–	1	9.5	36	12	0.1	0.25	1.5	5	1	0.1	25
LT1055A	LT	•	–	–	•	–	1	10	40	4	0.05	0.15	1.2	4	0.05	0.01	14
HA5170	HA	•	–	–	•	–	1	9	44	2.5	0.1	0.3	2	5	0.1	0.06	10

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e_n @1kHz typ nV/√Hz	Type	Slew rate[e] typ (V/µs)	f_T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input[f] (V)	Swing to supplies?[g] In	Swing to supplies?[g] Out	Comments
									+ −	+ −	
-	OP-01E	18	2.5	80	80	94	6	30	−	− − −	fast, precision
21	OP-02E	0.5	1.3	90	90	100	6	30	−	− − −	precision, low current
9.6	OP-05E	0.17	0.6	110	94	106	10	30[h]	−	− − −	
12	OP-11E	1	2	110	90	100	6	30	−	− − −	precision quad
16	307	0.5	1	70	70	84	10	30	•	− − −	a classic; uncomp=301
14	LM318	70	15	70	65	86	10	0.5	−	− − −	was popular
60	349	2	4	70	77	88	15	36	−	− − −	decomp 348 (quad 741)
20	AD517L	0.1	0.25	110	96	120	10	30	−	− − −	
-	AD518J	70	12	70	65	88	15	-	−	− − −	
30	NE530	35	3	70	76	94	10	30	•	− − −	fast; dual=5530
-	NE531	35	1	70	76	86	-	15	•	− − −	
18	NE538	60	5	70	76	94	10	30	•	− − −	fast; dual=5538
-	µA725	0.005	0.08	110	100	108	15	5	−	− − −	original precision op-amp
-	µA739	1	6	70	85[t]	76	1.5	5	−	− − •	low noise, intended for audio
-	741C	0.5	1.2	70	76	86	20	30	−	− − −	old classic; dual=1458, quad=348
-	748C	0.5	1.2	70	76	94	15	30	−	− − −	uncomp 741
-	µA749	2	6	70	74	86	1.5	5	−	− − •	sim to 739
-	1435	300	1GHz	80	75[t]	80	10	2	−	− − −	fast settle
45	1456	2.5	1	70	74	97	5	40	−	− − −	
-	HA2505	30	12	74	74	84	10	15	•	− − −	
-	HA2515	60	12	74	74	78	10	15	•	− − −	
-	HA2525	120	20	74	74	78	10	15	•	− − −	
-	HA2605	7	12	74	74	98	10	12	−	− − −	
-	HA2625	35	100	74	74	98	10	12	−	− − −	
-	CA3100	25	30	76	60	58	15	12	−	− − −	
43	4558	1	2.5	70	74	86	15	30	−	− − −	fast 1458
17	NE5535	15	1	70	76	94	10	30	•	− − −	fast
4	5539	600	1200	70	66	46	40	10	−	− − •	small output swing
32	OP-41E	1.3	0.5	100	92	120	15	20	•	− − −	low bias, low dist; OP-43 faster
001 32	OP-43E	6	2.4	100	92	120	15	20	•	− − −	low bias, low dist; OP-41 stabler
A 8	OPA101B	7	20	80	86	96	45	20	−	− − −	low noise; decomp = OPA102
7pA 7	OPA111B	2	2	100	100	120	10	36	−	− − −	low noise, low bias
A[t] 30	AD547L	3	1	80	80	108	20	20	−	− − −	dual = AD642, 647
005 30	AD548C	1.6	1	86	86	110	20	20	−	− − −	improved LF441; dual = AD648
02 5.2	OPA627B	55	16	106	106	110	30	-	−	− − −	fast
01 18	AD711C	20	4	86	86	106	20	20	−	− − −	improved LF411/2
1 25	AD845K	100	16	94	95	108	30	36	−	− − −	fast
01 14	LT1055A	13	5	86	90	104	30	40	−	− − −	LT1056 is 20% faster
06 10	HA5170	8	8	90	74	110	10	30	•	− − −	low noise

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TABLE 4.1 (*cont'd*)

Type	Mfg[a]	# per pkg[b] 1	2	4	Trim	Ext comp[c]	Min gain[d]	Total supply voltage min (V)	Total supply voltage max (V)	Supp curr max (mA)	Voltage: Offset typ (mV)	Voltage: Offset max (mV)	Voltage: Drift typ (µV/°C)	Voltage: Drift max (µV/°C)	Current: Bias max (nA)	Current: Offset max (nA)
JFET, HIGH-SPEED																
OP-42E	PM	•	–	–	•	–	1	15	40	6.5	0.3	0.75	4	10	0.2	0.04
OP-44E	PM	•	–	–	•	–	3	16	40	6	0.03	0.75	4	10	0.2	40pA
357B	NS+	•	–	–	•	–	5	10	36	7	3	5	5	-	100pA	0.02
AD380K	AD	•	–	–	•	•	U	12	40	15	-	1	-	10	0.1	5pA[t]
LF401A	NS	•	–	–	•	•	1	15	36	12	-	0.2	-	-	0.2	0.1
OPA404B	BB	–	–	•	–	–	1	10	36	10	0.26	0.75	3	-	0.004	4pA
LF457B	NS	•	–	–	•	–	5	10	36	10	0.18	0.4	3	4	50pA	20pA
OPA602C	BB	•	–	–	•	–	1	10	36	4	0.1	0.25	1	2	1pA	1pA
OPA605K	BB	•	–	–	•	•	50	10	40	9	0.25	0.5	-	5	0.035	2pA[t]
OPA606L	BB	•	–	–	•	–	1	10	36	9.5	0.1	0.5	3	5	0.01	5pA
AD744C	AD	•	A	–	•	•	2	9	36	4	0.1	0.25	2	3	0.05	0.02
AD843B	AD	•	–	–	•	–	1	9	36	12	0.5	1	15	-	1	0.1
AD845K	AD	•	–	–	•	–	1	9.5	36	10.2	0.1	0.25	1.5	3	0.4	0.05
LT1022A	LT	•	–	–	•	–	1	20	40	7	0.08	0.25	1.3	5	0.05	0.01
HA5160	HA	•	–	–	–	•	U	14	40	10	1	3	20	-	0.05	0.01
MC34080A	MO	•	A	A	•	–	2	6	44	3.4	0.3	0.5	10	-	0.2	0.1
MC34081A	MO	•	A	A	•	–	1	6	44	3.4	0.3	0.5	10	-	0.2	0.1
JFET, OTHER																
TL031C	TI	•	A	A	•	–	1	10	36	0.28	0.5	1.5	6	-	0.2	0.1
TL051C	TI	•	A	A	•	–	1	10	36	3.2	0.6	1.5	8	-	0.2	0.1
TL061C	TI+	•	A	A	•	–	1	4	36	0.25	3	15	10	-	0.4	0.2
TL071C	TI+	•	A	A	•	–	1	7	36	2.5	3	10	10	-	0.2	0.05
TL081B	TI+	•	A	A	•	–	1	7	36	2.8	2	3	10	-	0.2	0.01
OPA121	BB	•	–	–	•	–	1	10	36	4	0.5	2	3	10	0.005	4pA
OPA128L	BB	•	–	–	•	–	1	10	36	1.5	0.14	0.5	-	5	75fA	30fA[t]
LF351	NS+	•	A	A	•	–	1	10	36	3.4	5	10	10	-	0.2	0.1
355B	NS+	•	–	–	•	–	1	10	36	4	3	5	5	-	100pA	0.02
356B	NS+	•	–	–	•	–	1	10	36	7	3	5	5	-	100pA	0.02
LF411	NS+	•	A	–	•	–	1	10	36	3.4	0.8	2	7	20	0.2	0.1
LF*nnn*	NS	–	•	–	–	–	1	6	36	25	1	-	-	-	100pA	50pA
LF441	NS	•	A	A	•	–	1	10	36	0.25	1	5	10	20	0.1	0.05
LF455B	NS	•	–	–	•	–	1	10	36	4	0.18	0.4	3	4	50pA	20pA
LF456B	NS	•	–	–	•	–	1	10	36	8	0.18	0.4	3	4	50pA	20pA
AD549L	AD	•	–	–	•	–	1	10	36	0.7	0.3	0.5	5	10	60fA	20fA[t]
AD611K	AD	•	–	–	•	–	1	10	36	2.5	0.25	0.5	5	10	0.05	0.025
LT1057A	LT	–	•	A	–	–	1	20	40	3.8	0.15	0.45	1.8	7	0.05	0.04
HA5180	HA	•	–	–	•	–	1	10	40	1	0.1	0.5	5	-	0.001	200fA
MC34001A	MO	•	A	A	•	–	1	8	36	2.5	1	2	10	-	0.1	0.05
MC34181	MO	•	A	A	•	–	1	3	36	0.2	0.5	2	10	-	0.1	0.05

t ffset max nA)	e_n @1kHz typ nV/√Hz	Type	Slew rate[e] typ (V/µs)	f_T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input[f] (V)	Swing to supplies?[g] In	Swing to supplies?[g] Out	Comments
										+ −	+ −	
0.04	13	OP-42E	58	10	88	86	114	25	40	− −	− −	low Z_{out}
0pA	13	OP-44E	120	16	88	90	114	15	40	− −	− −	
0.02	12	357B	50	20	85	85	94	20	30	• −	− −	decomp 356
5pA[t]	15	AD360K	330	300	60	60	92	60	20	− −	− −	hybrid, fast, 50Ω
0.1	23	LF401A	30	16	90	80	100	50	32	− −	− −	accurate
pA	15	OPA404B	35	6.4	92	86	92	10	36	− −	− −	accurate quad
0pA	10	LF457B	50	20	86	86	106	100[l]	40	• −	− −	low noise; drives 0.01µF
pA	13	OPA602C	35	6.5	92	86	92	20	36	− −	− −	low bias, fast settle
pA[t]	20	OPA605K	94	20	80	74	104[t]	30	20	− −	− −	uncomp
pA	13	OPA606L	35	13	85	90	100	10	36	− −	− −	improved LF356
	18	AD744C	75	13	86	92	108	20	36	− −	− −	very low dist (3ppm); fast settle
	13	AD843B	250	35	100	95	88	50	-	− −	− −	fast settle
05	25	AD845K	100	16	94	98	106	25	20	− −	− −	fast settle
01	14	LT1022A	26	8.5	86	88	104	10	40	− −	− −	
01	35	HA5160	120	100	74	108	98	22	40	− −	− −	low bias
1	30	MC34080A	50	16	75	75	94	20	44	− −	− −	V_{in} > V-+4V; decomp 34081
1	30	MC34081A	25	8	75	75	94	20	44	− −	− −	V_{in} > V-+4V
1	41	TL031C	3	1	75	75	74	8	30	• −	− −	low power; improved TL061
1	18	TL051C	24	3	75	75	94	30	30	• −	− −	low dist; improved TL071/081
2	42	TL061C	3.5	1	70	70	70	5	30	− −	− −	low power
05	18	TL071C	13	3	70	70	88	10	30	− −	− −	lower noise
1	18	TL081B	13	3	80	80	94	10	30	− −	− −	
A	8	OPA121	2	2	86	86	110	10	36	− −	− −	low noise
t	27	OPA128L	3	1	90	90	110	10	36	− −	− −	very low bias
	25	LF351	13	4	70	70	88	10	30	• −	− −	353=dual, 347=quad
2	20	355B	5	2.5	85	85	94	20	30	• −	− −	popular
2	12	356B	12	5	85	85	94	20	30	• −	− −	faster 355
	25	LF411	15	4	70	70	88	20	30	• −	− −	jellybean
	3.5	LFnnn	20	10	80	80	100	15	2	• −	− −	lowest noise JFET
	35	LF441	1	1	70	70	88	4	30	• −	− −	low current jellybean
	12	LF455B	5	3	86	86	106	100[l]	40	• −	− −	low noise; drives 0.01µF
	10	LF456B	12.5	5	86	86	106	100[l]	40	• −	− −	low noise; drives 0.01µF
	35	AD549L	3	1	90	90	110	10	36	− −	− −	electrometer; guard pin
5	18	AD611K	13	2	80	80	94	20	20	− −	− −	low dist, gen purp JFET
	13	LT1057A	13	5	86	88	104	10	40	− −	− −	accurate dual/quad JFET
	70	HA5180	7	2	90	90	106	15	40	− −	− −	very low bias over temp; noisy
	25	MC34001A	13	4	80	80	94	20	30	• −	− −	
	38	MC34181	10	4	70	70	88	8	36	− −	− −	low power, fast, low dist.

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TABLE 4.1 (*cont'd*)

Type	Mfg[a]	# per pkg[b] 1	2	4	Trim	Ext comp[c]	Min gain[d]	Total supply voltage min (V)	max (V)	Supp curr max (mA)	Voltage: Offset typ (mV)	Offset max (mV)	Drift typ (μV/°C)	Drift max (μV/°C)	Current: Bias max (nA)	Offset max (nA)	e_n @1kHz typ nV/√Hz
JFET, OBSOLESCENT																	
OP-15E	PM+	•	A	–	•	–	1	10	44	4	0.2	0.5	2	5	0.05	0.01	15
OP-16E	PM+	•	–	–	•	–	1	10	44	7	0.2	0.5	2	5	0.05	0.01	15
AD515L	AD	•	–	–	•	–	1	10	36	1.5	0.4	1	-	25	80fA	80fA	50
AD542L	AD	•	–	–	•	–	1	10	36	1.5	-	0.5	-	5	0.025	2pA[t]	30
AD544L	AD	•	–	–	•	–	1	10	36	2.5	-	0.5	-	5	0.05	0.5pA[t]	18
AD545L	AD	•	–	–	•	–	1	10	36	1.5	-	0.5	-	5	0.001	-	35
ICH8500A	IL	•	–	–	•	–	1	16	36	2.5	-	50	-	-	10fA	10fA	40
MOSFET																	
OP-80E	PM	•	–	–	•	–	1	4.5	16	0.2	0.4	1	-	-	60fA	10fA[t]	70
TLC27L2A	TI	A	•	A	–	–	1	3	18	0.04	-	5	0.7	-	1pA[t]	1pA[t]	70
TLC27M2A	TI	A	•	A	–	–	1	3	18	0.6	-	5	2	-	1pA[t]	1pA[t]	38
TLC272A	TI	A	•	A	–	–	1	3	18	4	-	5	5	-	1pA[t]	1pA[t]	25
TLC279C	TI	–	–	•	–	–	1	3	18	8	0.4	1.2	2	-	0.7pA[t]	0.1pA[t]	25
LMC660A	NS	–	–	•	–	–	1	5	16	2.2	1	2	1.3	5	20pA	20pA	22
TLC1078C	TI	–	•	A	–	–	1	1.4	16	0.05	0.18	0.6	1	-	0.7pA[t]	0.1pA[t]	68
ALD1701	AL	•	–	–	–	–	1	2	12	0.25	-	4.5	7	-	0.03	0.025	-
ALD1702	AL	•	–	–	–	–	1	2	12	2	-	4.5	7	-	0.03	0.025	100
CA3140A	RC	•	A	–	•	–	1	4	44	6	2	5	6	-	0.04	0.02	40
CA3160A	RC	•	A	–	•	•	1	5	16	15	2	5	10	-	0.03	0.02	72
CA3410A	RC	–	–	•	–	–	1	4	36	10	3	8	10	-	0.03	0.01	40
CA3420A	RC	•	–	–	•	•	1	2	22	1	2	5	4	-	0.005	0.004	62
CA5160A	RC	•	A	–	•	•	1	5	15	0.4	1.5	4	-	-	0.01	0.005	-
CA5420A	RC	•	–	–	•	•	1	2	20	0.5	1	5	-	-	0.001	0.5pA	-
CA5422	RC	•	–	–	•	–	1	2	20	0.7	1.8	10	20	-	0.005	0.004	-
ICL7612B	IL+	•	–	–	–	–	1	3	18	2.5	-	5	5	-	0.05	0.03	100
ICL7641B	IL+	A	A	•	–	–	1	1	18	2.5	-	5	5	-	0.05	0.03	100
CHOPPER STABILIZED																	
MAX420E	MA	•	–	–	–	–	1	6	33	2	0.001	0.005	0.02	0.05	0.03	0.06	1.1[i]
MAX422E	MA	•	–	–	–	–	1	6	33	0.5	0.001	0.005	0.02	0.05	0.03	0.06	1.1[i]
LMC668A	NS	•	–	–	–	–	1	5	16	3.5	0.001	0.005	0.05	-	0.06	-	2[i]
TSC900A	TS	•	–	–	–	–	1	4.5	16	0.2	-	0.005	0.02	0.05	0.05	0.5pA[t]	4[i]
TSC901	TS	•	A	A	–	–	1	5	32	0.6	0.007	0.015	0.05	0.15	0.05	0.1	5[i]
TSC911A	TS	•	A	A	–	–	1	4	16	0.6	0.005	0.015	0.05	0.15	0.07	0.02	11[i]
TSC915	TS	•	–	–	–	–	1	7	32	1.5		0.01	0.01	0.1	0.1	0.1	0.8[i]
TSC918	TS	•	–	–	–	–	1	4.5	16	0.8	-	0.05	0.4	0.8	0.1	0.5pA[t]	4[i]
LTC1050	LT	•	–	–	–	–	1	4.8	16	1.5	0.5μV	0.005	0.01	0.05	0.03	0.06	1.6[i]
LTC1052	LT	•	–	–	–	–	1	4.8	16	2	0.5μV	0.005	0.01	0.05	0.03	0.03	1.5[i]
ICL7650	IL+	•	–	–	–	–	1	4.5	16	3.5	0.002	0.005	0.1	-	0.01	5pA[t]	2[i]
ICL7650S	IL	•	–	–	–	–	1	4.5	16	3	0.7μV	0.005	0.02	0.1	0.01	0.02	2[i]
ICL7652	IL+	•	–	–	–	–	1	5	16	3.5	0.002	0.005	0.1	-	0.03	25pA[t]	0.7[i]
ICL7652S	IL	•	–	–	–	–	1	5	16	2.5	0.7μV	0.005	0.01	0.06	0.03	0.04	0.7[i]
TSC76HV52	TS	•	–	–	–	–	1	7	32	1.5	-	0.01	-	0.3	0.1	0.1	0.8[i]

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ffset max nA)	e_n @1kHz typ nV/√Hz	Type	Slew rate[e] typ (V/µs)	f_T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input[f] (V)	Swing to supplies?[g] In +	In −	Out +	Out −	Comments
0.01	15	OP-15E	17	6	86	86	100	15	40	–	–	–	–	precision fast 355
0.01	15	OP-16E	25	8	86	86	100	20	40	–	–	–	–	precision fast 356 (OP-17=decomp)
0fA	50	AD515L	1	0.4	70	74	94	10	20	–	–	–	–	very low bias, precision
2pA[t]	30	AD542L	3	1	80	80	110	10	20	–	–	–	–	precision
0.5pA[t]	18	AD544L	13	2	80	80	94	15	20	–	–	–	–	precision, low noise
	35	AD545L	1	0.7	76	74[t]	92	10	20	–	–	–	–	precision
0fA	40	ICH8500A	0.5	0.5	60	80[t]	100[t]	10	0.5	–	–	–	–	ultra low bias
0fA[t]	70	OP-80E	0.4	0.3	60	60	100	10	16	–	•	–	•	electrometer; I_b<20pA @ 125°C
pA[t]	70	TLC27L2A	0.04	0.1	70	70	90	10	18	–	•	–	•	CMOS jellybeans
pA[t]	38	TLC27M2A	0.6	0.7	70	70	86	10	18	–	•	–	•	CMOS jellybeans
[t]	25	TLC272A	4.5	2.3	70	65	80	10	18	–	•	–	•	CMOS jellybeans
µA[t]	25	TLC279C	4.5	2.3	65	65	80	10	18	–	•	–	•	best V_{os} of 272-series
pA	22	LMC660A	1.7	1.5	72	80	112	15	16	–	•	•	•	quad CMOS jellybean
1pA[t]	68	TLC1078C	0.05	0.11	75	75	114	15	16	–	•	–	•	low offset
025	-	ALD1701	0.7	0.7	65	65	90	0.5	12	•	•	•	•	rail-to-rail; specs @ +5V supply
025	100	ALD1702	2.1	1.5	65	65	94	2	12	•	•	•	•	rail-to-rail; specs @ +5V supply
02	40	CA3140A	7	3.7	70	76	86	+10,-1	8	–	•	–	•	
.02	72	CA3160A	10	4	80	76	94	12	8	–	•	•	•	MOS in/out (3130=uncomp)
01	40	CA3410A	10	5.4	80	80	86	6	16	–	•	–	–	high speed 324-type replacement
004	62	CA3420A	0.5	0.5	60	70	86	2	15	–	•	•	•	low I_b, good input protec.
005	-	CA5160A	10	4	-	-	90	1	?	–	•	•	•	CMOS output
5pA	-	CA5420A	0.5	0.5	-	-	85	0.5	15	–	•	•	•	similar to 3420
004	-	CA5422	1	1	60	60	80	2	15	–	•	•	•	unusual 2-section design
03	100	ICL7612B	1.6	1.4	60	70	80	5[m]	18	•	•	•	•	programmable; in/out to both rails
03	100	ICL7641B	1.6	1.4	60	70	80	5[m]	18	•	–	•	•	gen purp, low voltage
06	1.1[j]	MAX420E	0.5	0.5	120	120	120	+2,-15	33	–	•	•	•	±15V V_s; 0.1µV/mo; 430 has C_{int}
06	1.1[j]	MAX422E	0.13	0.13	120	120	120	+0.2,-8	33	–	•	•	•	±15V V_s; 0.1µV/mo; 432 has C_{int}
	2[j]	LMC668A	2.5	1	120	120	120	+5,-15	16	–	•	•	•	
5pA[t]	4[j]	TSC900A	0.2	0.7	110	120	120	2.5	16	–	•	–	•	low power
[j]	5[j]	TSC901	2	0.8	120	120	120	-	36	–	•	–	•	±15V supply; int caps
02	11[j]	TSC911A	2.5	1.5	110	112	116	3.5	16	–	•	–	•	int caps, noisy
	0.8[j]	TSC915	0.5	0.5	120	120	120	10	36	–	•	–	•	±15V supply
5pA[t]	4[j]	TSC918	0.2	0.7	98	105	100	-	16	–	•	–	•	inexpensive
6	1.6[j]	LTC1050	4	2.5	120	125	130	+3,-20	16	–	•	•	•	int caps; 50nV/√month
3	1.5[j]	LTC1052	4	1.2	120	120	120	+5,-15	16	–	•	•	•	improved 7652; 0.1µV/month
A[t]	2[j]	ICL7650	2.5	2	110	120	120	+5,-20	16	–	•	•	•	0.1µV/month
2	2[j]	ICL7650S	2.5	2	120	120	136	+4,-20	16	–	•	•	•	improved 7650; 0.1µV/month
A[t]	0.7[j]	ICL7652	0.5	0.4	110	110	120	+5,-20	16	–	–	•	•	0.15µV/month
4	0.7[j]	ICL7652S	1	0.5	120	120	136	+4,-20	16	–	–	•	•	improved 7652; 0.15µV/month
	0.8[j]	TSC76HV52	0.5	0.5	120	120	120	10	32	–	–	•	•	±15V supply

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TABLE 4.1 (*cont'd*)

Type	Mfg[a]	# per pkg[b] 1	2	4	Trim	Ext comp[c]	Min gain[d]	Total supply voltage min (V)	Total supply voltage max (V)	Supp curr max (mA)	Voltage: Offset typ (mV)	Voltage: Offset max (mV)	Voltage: Drift typ (µV/°C)	Voltage: Drift max (µV/°C)	Current: Bias max (nA)	Current: Offset max (nA)	e_n @1kHz typ nV/√Hz
HIGH VOLTAGE																	
LM343	NS	•	–	–	•	–	1	10	68	5	2	8	-	-	40	10	35
LM344	NS	•	–	–	•	•	U	10	68	5	2	8	-	-	40	10	35
OPA445B	BB	•	–	–	•	–	1	20	100	4.5	1	3	10	-	0.05	0.01	16
1436	MO+	•	–	–	•	–	1	10	80	5	5	10	-	-	40	10	50
HA2645	HA	•	–	–	•	•	1	20	80	4.5	2	6	15	-	30	30	30
3580	BB	•	–	–	•	–	1	30	70	10	-	10	-	30	0.05	-	15
3581	BB	•	–	–	•	–	1	64	150	8	-	3	-	25	0.02	0.02	25
3582	BB	•	–	–	•	–	1	140	300	6.5	-	3	-	25	0.02	-	25
3583	BB	•	–	–	•	–	1	100	300	8.5	-	3	-	25	0.1	0.1	50
3584	BB	•	–	–	•	•	U	140	300	6.5	-	3	-	25	0.1	0.1	50
MONOLITHIC POWER																	
LM12	NS	•	–	–	–	–	1	20	80	80	2	7	-	50	300	100	90
OPA541B	BB	•	–	–	–	–	1	20	80	25	0.1	1	15	30	0.05	0.03	50
LM675	NS	•	–	–	–	–	10	16	60	50	1	10	25	-	2µA	500	-
SG1173	SG	•	–	–	–	–	1	10	50	20	2	4	-	30	500	150	-

[a] manufacturers are as follows (a "+" suffix designates multiple sources):

AD - Analog Devices
AL - Advanced Linear Devices
AM - Advanced Micro Devices
AN - Analogic
AP - Apex
BB - Burr-Brown
BT - Brooktree
CL - Comlinear
CR - Crystal Semiconductor
CY - Cypress
DA - Datel
EL - Elantec
FA - Fairchild (National)
FE - Ferranti
GE - General Electric
GI - General Instrument
HA - Harris
HI - Hitachi
HO - Honeywell
HS - Hybrid Systems
ID - Integrated Device Technology
IL - GE/Intersil
IN - Intel
IR - International Rectifier
KE - M.S.Kennedy Corp
LT - Linear Technology Corp
MA - Maxim
MN - Micro Networks
MO - Motorola
MP - Micro Power Systems
NE - NEC
NS - National Semiconductor
OE - Optical Electronics Inc
PL - Plessey
PM - Precision Monolithics
RA - Raytheon
RC - GE/RCA
RO - Rockwell
SG - Silicon General
SI - Siliconix
SN - Signetics
SO - Sony
ST - Supertex
TI - Texas Instruments
TM - Telmos
TO - Toshiba
TP - Teledyne Philbrick
TQ - TriQuint
TR - TRW
TS - Teledyne Semiconductor
VT - VTC
XI - Xicor
XR - Exar
ZI - Zilog

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Type	Slew rate[e] typ (V/µs)	f_T typ (MHz)	CMRR min (dB)	PSRR min (dB)	Gain min (dB)	Max output curr (mA)	Max diff'l input[f] (V)	Swing to supplies?[g] In +	In −	Out +	Out −	Comments
LM343	2.5	1	70	74	97	10	68	–	–	–	–	monolithic
LM344	30	10	70	74	97	10	68	–	–	–	–	uncomp 343
OPA445B	10	2	80	80	100	15	80	–	–	–	–	low-bias, monolithic
1436	2	1	70	80	97	10	80	–	–	–	–	monolithic
HA2645	5	4	74	74	100	10	37	–	–	–	–	monolithic
3580	15	5	86[t]	87[t]	106[t]	60	70	–	–	–	–	hybrid
3581	20	5	110[t]	105[t]	112[t]	30	150	–	–	–	–	hybrid
3582	20	5	110[t]	105[t]	118[t]	15	300	–	–	–	–	hybrid
3583	30	5	110[t]	84[t]	94	75	300	–	–	–	–	fast JFET, hybrid
3584	150	20	110[t]	84[t]	100	15	300	–	–	–	–	uncomp JFET, hybrid
LM12	9	0.7	75	80	94	10A	80	–	–	–	–	full output protection
OPA541B	10	1.6	95	100	90	10A	80	–	–	–	–	isolated case; no int. protec.
LM675	8	5.5	70	70	70	3000	60	–	–	–	–	full output protection
SG1173	0.8	1	76	80	92	3500	50	–	–	–	–	thermal shutdown

[a] the symbol • indicates the number of op-amps per package for the part number shown; an "A" indicates the availability of other quantities of op-amps per package from the same manufacturer; some electrical characteristics (particularly offset voltage) may be degraded somewhat in multiple packages.

[b] pins are provided for external compensation.

[c] a number gives the minimum closed-loop gain without instability. Op-amps with pins for external compensation can generally be operated at lower gain, if an appropriate ext comp network is used. The letter U means that the op-amp is uncompensated – external capacitance is necessary for any small value of closed-loop gain.

[e] at minimum stable closed-loop gain (usually unity gain), unless otherwise noted.

[f] the maximum value without damage to the chip; not to exceed the total supply voltage used, if that is less.

[g] a dot in an IN column means that the input operating common-mode range includes that supply rail; a dot in an OUT column means that the op-amp can swing its output all the way to the corresponding supply rail.

[h] resistor-diode network draws input current for input differential greater than ±1V.

[i] µV pp, 0.1-10Hz.

[j] current-sensing inverting input ("current feedback" configuration); the bias currents at the two inputs may differ widely. The listed bias current is for the non-inverting input.

[k] "raw" output (no current limit) available at pin 8, in addition to the conventional (protected) output at pin 6; the latter is limited to ±15mA.

[t] min/max (worst case).

typical.

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TABLE 4.2. RECOMMENDED OP-AMPS

Type	Mfg[a]	Amps per package[b] 1	2	4	Offset voltage max (mV)	Offset drift max (µV/°C)	Input curr max (nA)	Total supply voltage min (V)	Total supply voltage max (V)	Supply curr max (mA)	e_n, typ 10Hz (nV/√Hz)	e_n, typ 1kHz (nV/√Hz)	Slew rate typ (V/µs)	f_T typ (MHz)	Comments
LF411	NS	•	A	–	2	20	0.2	10	36	3.4	50	25	15	4	general purpose jellybean
AD711K	AD	•	A	–	0.5	10	0.05	9	36	3	45	18	20	4	improved LF411
LM358A	NS+	–	•	A	3	20	100	3	32	1.2	–	–	0.5	1	single supply jellybean
TLC27M2A	TI	A	•	A	5	2[t]	0.001[t]	3	18	0.6	–	–	0.6	0.7	CMOS jellybean
OP-27E	PM+	•	A	A	0.025	0.6	40	8	44	5	3.5	3.0	2.8	8	precision, low-noise
OP-37E	PM+	•	A	–	0.025	0.6	40	8	44	5	3.5	3.0	17[h]	63[h]	ditto, faster (decomp, min. gain = 5)
HA5147A	HA	•	–	–	0.025	0.6	40	8	44	4	3.5	3.0	35[c]	140[c]	ditto, still faster (min. gain = 10)
OP-77E	PM	•	A	A	0.025	0.3	2	6	44	2	10.3	9.6	0.3	0.6	precision
LT1028A	LT	•	–	–	0.04	0.8	90	8	44	9.5	1.0	0.85	15	75	precision ultra-low-noise
LT1013A	LT	–	•	A	0.15	2	35	4	44	1	24	22	0.4	0.8	precision single-supply
LT1055A	LT	•	–	–	0.15	4	0.05	10	40	4	28	14	13	5	precision JFET
LT1012C	LT+	•	A	–	0.05	1.5	0.15	4	40	0.6	17	14	0.2	0.8	precision low-bias
OPA111B	BB	•	A	–	0.25	1	0.001	10	36	3.5	30	7	2	2	precision low-bias JFET
AD744K	AD	•	–	–	0.5	10	0.1	9	36	4	45	18	75[f]	13[f]	ultra low dist, stable, fast settle
LTC1052	IL+	•	–	–	0.005	0.05	0.03	4.8	16	2	–	–	4	1.2	chopper
OP-90E	PM	•	A	A	0.15	2	15	1.6	36	0.02	60	60	0.012	0.02	precision micropower
CA3440A	RC	•	–	–	5	4[t]	0.04	4	15	(d)	250	110	0.003[e]	0.005[e]	nanopower (programmable)
AD549L	AD	•	–	–	0.5	10	60fA	10	36	0.7	90	35	3	1	ultra low input current JFET
LM10	NS+	•	–	–	2	2[t]	20	1.1	40	0.4	50	46	0.1	0.4	low supply voltage, rail-to-rail output

[a] see footnotes to Table 4.1. [b] • = this part number; A = available. [c] G>10. [d] programmable 0.02µA–10µA. [e] at I_s=1µA. [f] G>2. [h] G>5. [m] min/max. [t] typical.

Cuadro I.– Amplificadores operacionales BiFET.

Tipo	Alimentación		Decalaje y deriva			I_{polar} (pA)	Ganancia (V/mV)	Anchura de banda con ganancia unitaria (MHz)	Ruido para 1 kHz (nV/√Hz)	"Slew-rate" (V/µs)	Fabricante	Cápsula (Fig. 1-4)
	± U (V)	I (mA)	U (mV)	ΔU (µV/°C)	I (pA)							
(µA 741 C)	2,5 à 18	1,4 (< 2,8)	2 (< 6)	–	20 nA	100 nA	200 (> 20)	1	–	–	–	(B)
HA 5100-5	20 max.	5 (< 7)	0,5 (< 1)	10	< 10	20 (< 50)	150 (> 75)	18	–	8 (> 6)	Harris	A
HA 5105-5	20 max.	6 (< 8)	0,5 (< 1,5)	15	10 (< 20)	50 (< 100)	100 (> 50)	18	–	8 (< 5)	Harris	A
LF 355	5 à 18	2 (< 4)	3 (< 10)	5	3 (< 50)	30 (< 200)	200 (> 25)	2,5	20	5	Mo, NS Sig	B
LF 356	5 à 18	5 (< 10)	3 (< 10)	5	3 (< 50)	30 (< 200)	200 (> 25)	5	12	12 (> 7,5)	Mo, NS Sig	B
LF 357	5 à 18	5 (< 10)	3 (< 10)	5	3 (< 50)	30 (< 200)	200 (> 25)	20	12	50	Mo, NS Sig	B
LH 0032 C	5 à 18	20 (< 22)	1 (< 3)	25	10 (< 50)	25 (< 200)	3 (> 1)	70		500	NS	C
NE 536	6 à 18	6 (< 8)	30 (< 90)	30	5	30 (< 100)	> 50	1	20 µV, 0 à 100 kHz	1	Sig	B
TL 060... 4 C	2 à 18	0,2 (< 0,25)	3 (< 15)	10	5 (< 200)	30 (< 400)	6 (> 3)	1	42	3,5	TI	E... H
TL 070... 5 C	2,5 à 18	1,4 (< 2,5)	3 (< 15)	10	5 (< 200)	30 (< 400)	200 (> 3)	3	18	13	TI	D... I
TL 080... 5 C	2,5 à 18	1,4 (< 2,5)	5 (< 10)	10	5 (< 200)	30 (< 400)	200 (> 25)	3	25	-	TI	D... I
TL 087 C TL 287 C	3 à 18	1,4 (< 2,8)	0,1 (< 0,5)	10	5 (< 100)	30 (< 400)	200 (> 25)	3	18	13	TI	E, F
µA 740 C	22 max.	4,2 (< 8)	30 (< 110)		60 (< 300)	100	1 000 (> 20)	1	–	6	Fair Sig	B
1421	12 à 18	2,8 (< 3,5)	3 (< 15)	10 (< 50)	-	15 (< 50)	160 (> 50)	2	2 µV, 1,6 à 160 Hz	5 (> 3)	TPh	B
1424	12 à 18	< 6	< 50	-	-	10 (< 50)	40 (> 20)	1	2 µV, 1,6 à 160 Hz	6	TPh	B
1425	12 à 18	2,8 (< 3,5)	< 2	< 50	-	5 (< 10)	160 (< 50)	2	2 µV, 1,6 à 160 Hz	5 (> 3)	TPh	B

La *anchura de banda con ganancia unitaria* (contra-reacción total), generalmente sólo es utilizable cuando no se requiera una amplitud de salida mayor a 1 V.

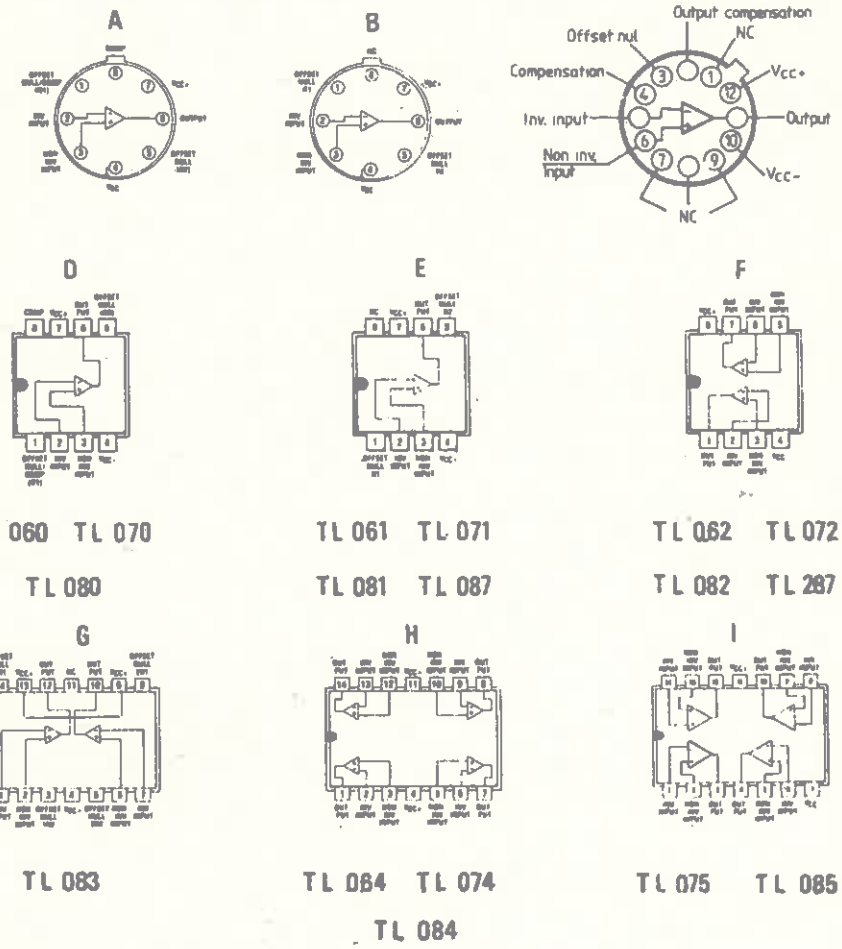

Fig. 1-4.– Disposición de las conexiones para los circuitos mencionados en los Cuadros I y II. Las cápsulas pueden verse en la parte inferior.

La *tensión de ruido* puede calcularse multiplicando el valor indicado (expresado en nV) por la raíz cuadrada de la anchura de banda útil.

En el caso de un amplificador ideal, la resistencia de entrada del montaje sería igual a R1, es decir, de 1000 ohmios en el caso que nos ocupa. Si se considera la incidencia de la ganancia propia y la de la resistencia de entrada del amplificador, r_i, la resistencia de entrada del montaje sería:

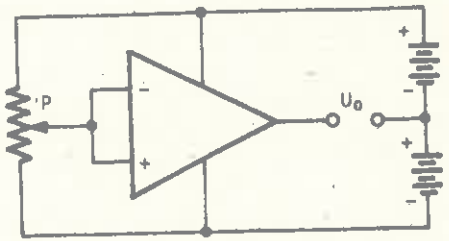

Fig. 2-4.– El ideal que se desearía poder alcanzar es un amplificador cuya tensión de salida fuese nula, cuando ambas entradas se encuentran reunidas, y que permanece nula cuando se maniobra P.

$$r_O = R1 + \frac{r_i R_F}{R_F + A_O r_i},$$

con r_o = 1007 ohmios, r_i = 200 kilohmios y los valores de los ejemplos precedentes.

En el caso de un amplificador bipolar, el valor de R_P debe ser, como antes, aproximadamente igual al valor resultante de poner en paralelo R1 con R_F. Si se utiliza un amplificador con entrada FET, se puede reemplazar simplemente por un cortocircuito.

2.3. Compensación del decalaje

Si existiese un amplificador operacional ideal, se podría utilizar en el montaje de la Fig. 2-4, obteniéndose entonces una tensión de salida u_o nula, por el simple hecho de que la tensión entre sus dos entradas es asímismo nula, y esta tensión de salida sería también igual a cero cuando se varía simultáneamente, en "modo común", la tensión de sus dos entradas, accionando sobre el potenciómetro P.

De hecho, todo amplificador real resulta afectado por un fenómeno de decalaje, cuyo efecto es idéntico al de una fuente de alimentación continua (de 1 mV, aproximadamente) que se encontrara intercalada, en la Fig. 2-4, en una de las dos entradas del amplificador. Esta estará

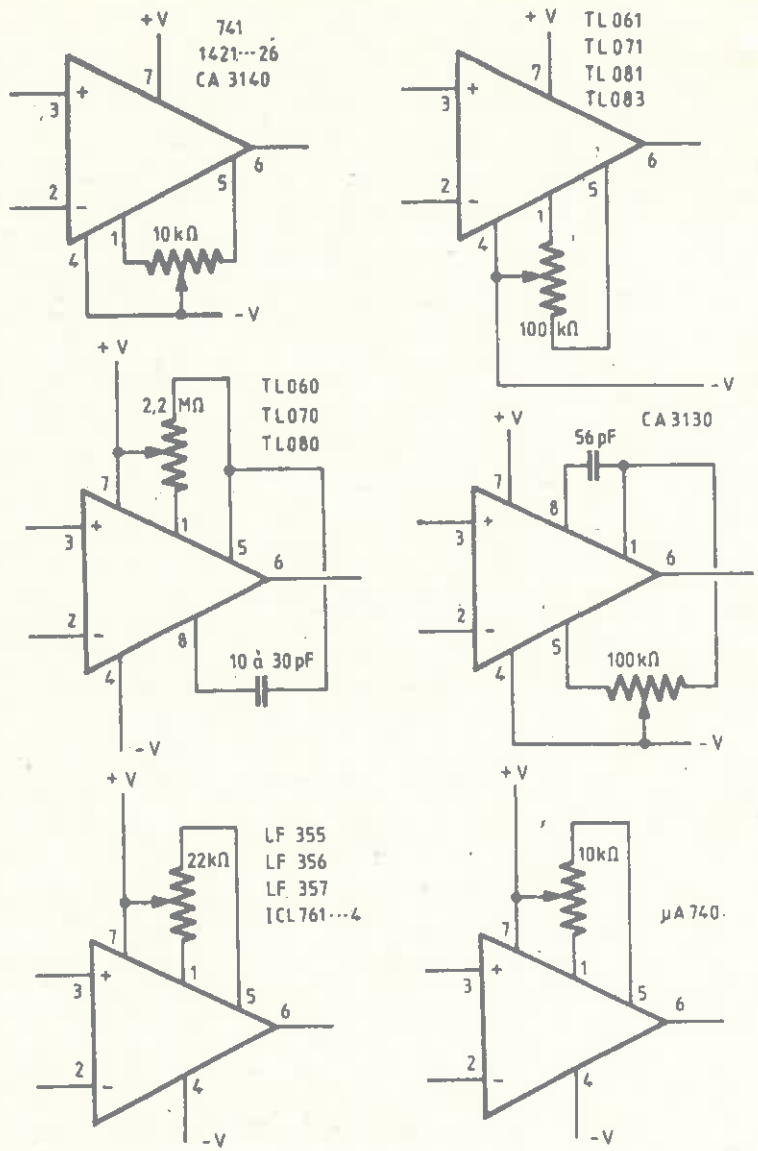

Fig. 2-5.– Algunos amplificadores operacionales poseen entradas que permiten efectuar la conexión de un potenciómetro, con el cual se puede compensar la tensión de decalaje.