TYPE NUMBER	MFR	APP	CMP	GBP MIN	SLEW RATE MIN	V_S^+ MAX	V_S^- MAX	T_{op} MAX	A_{VOL} MIN	V_{IO} MAX	I_B MAX	I_{IO} MAX	P_{TOT} MAX	I_{OUT} MIN	V_{OUT} MIN	V_{ICM} MAX	V_{IDF} MAX	dV_{IO}/dT MAX	P_D MAX	I_D MAX	CMRR MIN	PSRR MIN	R_{IN} MIN
LM344H	NAU	HVO	EXT	.3MHZ	1V/uS	+34V	-34V	70C	97dB	8MV	40NA	10NA	680MWF	4MA	20V	34V	68V	.	.	5MA	70dB	74dB	.
LM348D	NAU	QGK	INT	.3MHZ	0.2V/uS	+18V	-18V	70C	88dB	6MV	200NA	50NA	900MWF	5MA	12V	18V	36V	.	.	1MA	70dB	77dB	300K
LM348J	NAU	QGK	INT	.3MHZ	0.2V/uS	+18V	-18V	70C	88dB	6MV	200NA	50NA	900MWF	5MA	12V	18V	36V	.	.	1MA	70dB	77dB	300K
LM348N	NAU	QGK	INT	.3MHZ	0.2V/uS	+18V	-18V	70C	88dB	6MV	200NA	50NA	900MWF	5MA	12V	18V	36V	.	.	1MA	70dB	77dB	300K
LM349D	NAU	QGK	INT	1MHZ	0.5V/uS	+18V	-18V	70C	88dB	6MV	200NA	50NA	900MWF	5MA	12V	18V	36V	.	.	1MA	70dB	77dB	300K
LM349J	NAU	QGK	INT	1MHZ	0.5V/uS	+18V	-18V	70C	88dB	6MV	200NA	50NA	900MWF	5MA	12V	18V	36V	.	.	1MA	70dB	77dB	300K
LM349N	NAU	QGK	INT	1MHZ	0.5V/uS	+18V	-18V	70C	88dB	6MV	200NA	50NA	900MWF	5MA	12V	18V	36V	.	.	1MA	70dB	77dB	300K
LM358AH	NAU	DGK	INT	.	.	+16V	-16V	70C	88dB	3MV	100NA	30NA	500MWF	10MA	.	16V	32V	20uV/C	.	3MA	65dB	65dB	.
LM358AN	NAU	DGK	INT	.	.	+16V	-16V	70C	88dB	3MV	100NA	30NA	500MWF	10MA	.	16V	32V	20uV/C	.	3MA	65dB	65dB	.
LM358D	MUG	DGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	.	10MA	.	16V	32V	30uV/C	.	3MA	65dB	65dB	.
LM358H	NAU	DGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	500MWF	10MA	.	16V	32V	30uV/C	.	3MA	65dB	65dB	.
LM358N	NAU	DGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	570MWF	10MA	.	16V	32V	30uV/C	.	3MA	65dB	65dB	.
LM358N(8)	MUG	DGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	570MWF	10MA	.	16V	32V	30uV/C	.	3MA	65dB	65dB	.
LM358T	MUG	DGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	500MWF	10MA	.	16V	32V	30uV/C	.	3MA	65dB	65dB	.
LM358V	MUG	DGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	570MWF	10MA	.	16V	32V	30uV/C	.	3MA	65dB	65dB	.
LM360D	NAU	CPR	EXT	.	.	+8V	-8V	70C	.	5MV	20uA	3uA	.	6MA	.	4V	5V	40uV/C	.	32MA	.	.	5K
LM360H	NAU	CPR	EXT	.	.	+8V	-8V	70C	.	5MV	20uA	3uA	.	6MA	.	4V	5V	40uV/C	.	32MA	.	.	5K
LM360J-14	NAU	CPR	EXT	.	.	+8V	-8V	70C	.	5MV	20uA	3uA	.	6MA	.	4V	5V	40uV/C	.	32MA	.	.	5K
LM360N-8	NAU	CPR	EXT	.	.	+8V	-8V	70C	.	5MV	20uA	3uA	.	6MA	.	4V	5V	40uV/C	.	32MA	.	.	5K
LM360N-14	NAU	CPR	EXT	.	.	+8V	-8V	70C	.	5MV	20uA	3uA	.	6MA	.	4V	5V	40uV/C	.	32MA	.	.	5K
LM361D	NAU	CPR	EXT	.	.	+16V	-16V	70C	60dB	5MV	30uA	5uA	600MWF	18MA	.	6V	5V	.	.	20MA	.	.	8K
LM361J	NAU	CPR	EXT	.	.	+15V	-16V	70C	60dB	5MV	30uA	5uA	600MWF	18MA	.	6V	5V	.	.	20MA	.	.	8K
LM361H	NAU	CPR	EXT	.	.	+16V	-16V	70C	60dB	5MV	30uA	5uA	600MWF	18MA	.	6V	5V	.	.	20MA	.	.	8K
LM361N	NAU	CPR	EXT	.	.	+16V	-16V	70C	60dB	5MV	30uA	5uA	600MWF	18MA	.	6V	5V	.	.	20MA	.	.	8K
LM381AN	NAU	DLN	INT	5MHZ	.	+20V	-20V	70C	94dB	.	1uA	.	800MWF	1MA	19V	.	.	.	.	20MA	.	100dB	40K
LM381N	NAU	DLN	INT	5MHZ	.	+20V	-20V	70C	94dB	.	1uA	.	800MWF	1MA	19V	.	.	.	.	20MA	.	100dB	40K
LM382N	NAU	DLN	INT	5MHZ	.	+20V	-20V	70C	90dB	.	2uA	.	800MWF	1MA	.	.	.	.	.	16MA	.	100dB	40K
LM387AN	NAU	DLN	INT	5MHZ	.	+20V	-20V	70C	94dB	.	3uA	.	660MWF	1MA	.	.	.	.	.	15MA	.	100dB	50K
LM387N	NAU	DLN	INT	5MHZ	.	+15V	-15V	70C	94dB	.	3uA	.	660MWF	1MA	.	.	.	.	.	15MA	.	100dB	50K
LM393AH	NAU	DCP	EXT	.	.	+18V	-18V	85C	94dB	2MV	250NA	50NA	900MWF	6MA	.	18V	36V	.	.	3MA	.	.	.
LM393AN	NAU	DCP	EXT	.	.	+18V	-18V	85C	94dB	2MV	250NA	50NA	570MWF	6MA	.	18V	36V	.	.	3MA	.	.	.
LM393H	NAU	DCP	EXT	.	.	+18V	-18V	85C	94dB	5MV	250NA	50NA	900MWF	6MA	.	18V	36V	.	.	3MA	.	.	.
LM393N	NAU	DCP	EXT	.	.	+18V	-18V	85C	94dB	5MV	250NA	50NA	570MWF	6MA	.	18V	36V	.	.	3MA	.	.	.
LM393N(8)	MUG	DCP	EXT	.	.	+18V	-18V	70C	94dB	5MV	250NA	50NA	570MWF	6MA	.	18V	36V	.	.	3MA	.	.	.
LM393T	MUG	DCP	EXT	.	.	+18V	-18V	70C	94dB	5MV	250NA	50NA	900MWF	6MA	.	18V	36V	.	.	3MA	.	.	.
LM393V	MUG	DCP	EXT	.	.	+18V	-18V	70C	94dB	5MV	250NA	50NA	570MWF	6MA	.	18V	36V	.	.	3MA	.	.	.
LM709AJ	NAU	GPU	EXT	.3MHZ	.15V/uS	+18V	-18V	125C	88dB	2MV	200NA	50NA	670MWF	5MA	12V	10V	5V	10uV/C	108MW	4MA	80dB	80dB	350K
LM709CH	NAU	GPU	EXT	.3MHZ	.15V/uS	+18V	-18V	70C	84dB	7.5MV	1.5uA	0.5uA	500MWF	5MA	12V	10V	5V	.	200MW	.	65dB	74dB	50K
LM709CJ	NAU	GPU	EXT	.3MHZ	.15V/uS	+18V	-18V	70C	84dB	7.5MV	1.5uA	0.5uA	670MWF	5MA	12V	10V	5V	.	200MW	.	65dB	74dB	50K
LM709CN	NAU	GPU	EXT	.3MHZ	.15V/uS	+18V	-18V	70C	84dB	7.5MV	1.5uA	0.5uA	670MWF	5MA	12V	10V	5V	.	200MW	.	65dB	74dB	50K
LM709CN-8	NAU	GPU	EXT	.3MHZ	.15V/uS	+18V	-18V	70C	84dB	7.5MV	1.5uA	0.5uA	670MWF	5MA	12V	10V	5V	.	200MW	.	65dB	74dB	50K
LM709H	NAU	GPU	EXT	.3MHZ	.15V/uS	+18V	-18V	125C	88dB	5MV	500NA	200NA	500MWF	5MA	12V	10V	5V	15uV/C	165MW	.	70dB	76dB	150K
LM709J	NAU	GPU	EXT	.3MHZ	.15V/uS	+18V	-18V	125C	88dB	5MV	500NA	200NA	670MWF	5MA	12V	10V	5V	15uV/C	165MW	.	70dB	76dB	150K
LM710CH	NAU	CPR	EXT	.	.	+14V	-7V	70C	60dB	5MV	25uA	5uA	500MWF	1MA	1V	7V	5V	20uV/C	150MW	9MA	70dB	.	.
LM710H	NAU	CPR	EXT	.	.	+14V	-7V	125C	61dB	2MV	20uA	3uA	500MWF	2MA	1V	7V	5V	10uV/C	150MW	9MA	80dB	.	.
LM711CH	NAU	DCP	EXT	.	.	+14V	-7V	70C	57dB	5MV	100uA	25uA	500MWF	.	.	7V	5V	20uV/C	180MW	.	70dB	.	.
LM711CN	NAU	DCP	EXT	.	.	+14V	-7V	70C	57dB	5MV	100uA	25uA	670MWF	.	.	7V	5V	20uV/C	180MW	.	70dB	.	.
LM711H	NAU	DCP	EXT	.	.	+14V	-7V	125C	58dB	3.5MV	75uA	10uA	500MWF	.	.	7V	5V	20uV/C	180MW	.	70dB	.	.
LM725AH	NAU	PIA	EXT	.	.	+22V	-22V	125C	120dB	0.5MV	75NA	5NA	500MWF	6MA	12V	22V	5V	2uV/C	120MW	.	120dB	106dB	500K
LM725AJ-14	NAU	PIA	EXT	.	.	+22V	-22V	125C	120dB	0.5MV	75NA	5NA	500MWF	6MA	12V	22V	5V	2uV/C	120MW	.	120dB	106dB	500K
LM725CH	NAU	PIA	EXT	.	.	+22V	-22V	70C	106dB	2.5MV	125NA	35NA	500MWF	5MA	12V	22V	5V	10uV/C	150MW	.	94dB	90dB	500K
LM725CJ-14	NAU	PIA	EXT	.	.	+22V	-22V	70C	106dB	2.5MV	125NA	35NA	500MWF	5MA	12V	22V	5V	10uV/C	150MW	.	94dB	90dB	500K
LM725CN	NAU	PIA	EXT	.	.	+22V	-22V	70C	106dB	2.5MV	125NA	35NA	500MWF	5MA	12V	22V	5V	10uV/C	150MW	.	94dB	90dB	500K
LM725D	NAU	PIA	EXT	.	.	+22V	-22V	125C	120dB	1MV	100NA	20NA	500MWF	5MA	12V	22V	5V	5uV/C	105MW	.	110dB	100dB	500K
LM725J-14	NAU	PIA	EXT	.	.	+22V	-22V	125C	120dB	1MV	100NA	20NA	500MWF	5MA	12V	22V	5V	5uV/C	105MW	.	110dB	100dB	500K
LM725H	NAU	PIA	EXT	.	.	+22V	-22V	125C	120dB	1MV	100NA	20NA	500MWF	5MA	12V	22V	5V	5uV/C	105MW	.	110dB	100dB	500K
LM733CD	NAU	BDO	EXT	20MHZ	.	+8V	-8V	70C	48dB	6MV	30uA	5uA	670MWF	2MA	3V	6V	5V	.	.	24MA	60dB	50dB	2K
LM733CH	NAU	BDO	EXT	20MHZ	.	+8V	-8V	70C	48dB	6MV	30uA	5uA	500MWF	2MA	3V	6V	5V	.	.	24MA	60dB	50dB	2K
LM733CJ	NAU	BDO	EXT	20MHZ	.	+8V	-8V	70C	48dB	6MV	30uA	5uA	670MWF	2MA	3V	6V	5V	.	.	24MA	60dB	50dB	2K
LM733CN	NAU	BDO	EXT	20MHZ	.	+8V	-8V	70C	48dB	6MV	30uA	5uA	670MWF	2MA	3V	6V	5V	.	.	24MA	60dB	50dB	2K

For detailed explanations of column heading notations, see App. A.

Also for ready references the more important abbreviations used in the column headings are listed below:

LEFT HAND PAGE

APP = application (codes at APP.E.)

CMRR = common mode rejection ratio

CMP = compensation (frequency)

dV_{IO}/dT = input offset voltage temperature drift

GBP = gain bandwidth product

I_B = input bias current

I_{IO} = input bias offset current

I_D = quiescent supply current

MFR = manufacturer (codes at App.C.)

P_D = quiescent power consumer

PSRR = power supply rejection ratio

V_{ICM} = common mode input voltage rating

V_{IDF} = differential input voltage rating

V_{IO} = input offset voltage

V_S = dc supply voltage

RIGHT HAND PAGE

Lead out coding summary (details at APP.G.) for different cases (APP.F.)

A = gain adjust

B = bias adjust

C = case

E− = inverting input

E+ = non-inverting input

F,F* = input frequency compensation

G = ground

J = high level input

K = output, open collector

L = output, open emitter

M = metal case

N = not connected

Q = special terminal

R,R* = outputs

S = strobe

T,T* = offset balance

V+ = +ve dc supply

V− = −ve dc supply

W = guard ring

X = blank position, no lead

+ + = +ve supplementary dc supply

− − = −ve supplementary dc supply

ø,ø* = output frequency compensation

CASE (APP.F.)	LD 1	LD 2	LD 3	LD 4	LD 5	LD 6	LD 7	LD 8	LD 9	LD 10	LD 11	LD 12	LD 13	LD 14	LD 15	LD 16	EUROPE SUBSTITUTE	USA SUBSTITUTE	I SS	TYPE NUMBER
TO5-8/1M	FT	E-	E+	V-M	T*	R	V+	F*	.	.	.	.	.	.	.	.	.	.	0	LM344H
DIL-14/1M	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	V-	E+4	E-4	R4	.	.	.	LM349D	0	LM348D
DIL-14/1C	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	V-	E+4	E-4	R4	.	.	.	LM349D	0	LM348J
DIL-14/1P	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	V-	E+4	E-4	R4	.	.	.	LM349D	0	LM348N
DIL-14/1M	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	V-	E+4	E-4	R4	.	.	.	LM348D	0	LM349D
DIL-14/1C	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	V-	E+4	E-4	R4	.	.	.	LM348D	0	LM349J
DIL-14/1P	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	V-	E+4	E-4	R4	.	.	.	LM348D	0	LM349N
TO5-8/1M	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	.	LM258AH	0	LM358AH
DIL-8/1P	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	.	MLM158U	0	LM358AN
MDL-8/2P	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	.	TDA0358	0	LM358D
TO5-8/1M	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	.	MLM358G	0	LM358H
DIL-8/1P	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	.	MLM358U	0	LM358N
DIL-8/1P	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	MLM358U	LM358N	0	LM358N(8)
TO5-8/1M	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	MLM358G	LM358H	0	LM358T
DIL-8/1P	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	MLM358U	LM358N	0	LM358V
DIL-14/1M	N	N	N	E-	E+	V-	N	N	G	R	R*	V+	N	N	.	.	.	UA760DC	0	LM360D
TO5-8/1M	N	E-	E+	V-	G	R	R*	V+	.	.	.	.	.	.	.	.	.	UA760HC	0	LM360H
DIL-14/1C	N	N	N	E-	E+	V-	N	N	G	R	R*	V+	N	N	.	.	.	UA760DC	0	LM360J-14
DIL-8/1P	N	E-	E+	V-	G	R	R*	V+	.	.	.	.	.	.	.	.	.	.	0	LM360N-8
DIL-14/1P	N	N	N	E-	E+	V-	N	N	G	R	R*	V+	N	N	.	.	.	UA760DC	0	LM360N-14
DIL-14/1M	V+	N	E+	E-	N	V-	N	S2	R	G	R*	N	S1	++	.	.	.	LM261D	0	LM361D
DIL-14/1C	V+	N	E+	E-	N	V-	N	S2	R	G	R*	N	S1	++	.	.	.	LM261J	0	LM361J
TO5-10/1M	E+	E-	V-	S2	R	G	R*	S1	++	V+	.	.	.	.	.	.	.	LM261H	0	LM361H
DIL-14/1P	V+	N	E+	E-	N	V-	N	S2	R	G	R*	N	S1	++	.	.	.	LM261D	0	LM361N
DIL-14/1P	E+1	E-1	Q1	G	F1	F*1	R1	R2	V+	F2	F*2	Q2	E-2	E+2	.	.	.	.	0	LM381AN
DIL-14/1P	E+1	E-1	Q1	G	F1	F*1	R1	R2	V+	F2	F*2	Q2	E-2	E+2	.	.	.	LM381AN	0	LM381N
DIL-14/1P	E+1	E-1	A1	G	A*1	A*1	R1	R2	A*2	A*2	V+	A2	E-2	E+2	.	.	.	.	0	LM382N
DIL-8/1P	E+1	E-1	G	R1	R2	V	E-2	E+2	.	.	.	.	.	.	.	.	.	.	0	LM387AN
DIL-8/1P	E+1	E-1	G	R1	R2	V	E-2	E+2	.	.	.	.	.	.	.	.	.	LM387AN	0	LM387N
TO5-8/1M	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	.	LM293AH	0	LM393AH
DIL-8/1P	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	.	.	0	LM393AN
TO5-8/1M	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	.	LM393AH	0	LM393H
DIL-8/1P	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	.	LM393AN	0	LM393N
DIL-8/1P	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	LM393V	LM393N	0	LM393N(8)
TO5-8/1M	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	.	LM393H	0	LM393T
DIL-8/1P	R1	E-1	E+1	G	E+2	E-2	R2	V+	.	.	.	.	.	.	.	.	.	LM393N	0	LM393V
DIL-14/1C	N	N	F	E-	E+	V-	N	N	ø	R	V+	F*	N	N	.	.	.	UA709ADM	0	LM709AJ
TO5-8/1M	F	E-	E+	V-	ø	ø*R	V+	F*	.	.	.	.	.	.	.	.	TAA521	UA709HC	0	LM709CH
DIL-14/1C	N	N	F	E-	E+	V-	N	N	ø	R	V+	F*	N	N	.	.	TAA521A	UA709DC	0	LM709CJ
DIL-14/1P	N	N	F	E-	E+	V-	N	N	ø	R	V+	F*	N	N	.	.	TAA521A	UA709DC	0	LM709CN
DIL-8/1P	F	E-	E+	V-	ø	ø*R	V+	F*	.	.	.	.	.	.	.	.	MC1709U	UA709TC	0	LM709CN-8
TO5-8/1M	F	E-	E+	V-	ø	ø*R	V+	F*	.	.	.	.	.	.	.	.	TAA522	UA709HM	0	LM709H
DIL-14/1C	N	N	F	E-	E+	V-	N	N	ø	R	V+	F*	N	N	.	.	.	UA709DM	0	LM709J
TO5-8/1M	G	E+	E-	V-M	N	N	R	V+	.	.	.	.	.	.	.	.	SFC2710C	UA710HC	0	LM710CH
TO5-8/1M	G	E+	E-	V-M	N	N	R	V+	.	.	.	.	.	.	.	.	SFC2710M	UA710HM	0	LM710H
TO5-10/1M	G	S1	E-1	E+1	V-	E+2	E-2	S2	R	V+	.	.	.	.	.	.	SFC2711C	UA711HC	0	LM711CH
DIL-14/1P	N	E-1	E+1	V-	E+2	E-2	N	N	S2	R	V+	G	S1	N	.	.	SFC2711EC	UA711DC	0	LM711CN
TO5-10/1M	G	S1	E-1	E+1	V-	E+2	E-2	S2	R	V+	.	.	.	.	.	.	SFC2711M	UA711HM	0	LM711H
TO5-8/1M	T	E-	E+	V-	ø	ø*R	V+	T*	.	.	.	.	.	.	.	.	.	UA725AHM	0	LM725AH
DIL-14/1C	N	N	T	E-	E+	V-	N	N	ø	ø*R	V+	T*	N	N	.	.	.	.	0	LM725AJ-14
TO5-8/1M	T	E-	E+	V-	ø	ø*R	V+	T*	.	.	.	.	.	.	.	.	.	UA725HC	0	LM725CH
DIL-14/1C	N	N	T	E-	E+	V-	N	N	ø	ø*R	V+	T*	N	N	.	.	.	LM725J-14	0	LM725CJ-14
DIL-8/1P	T	E-	E+	V-	ø	ø*R	V+	T*	.	.	.	.	.	.	.	.	.	.	0	LM725CN
DIL-14/1M	N	N	T	E-	E+	V-	N	N	ø	ø*R	V+	T*	N	N	.	.	.	LM725AJ-14	0	LM725D
DIL-14/1C	N	N	T	E-	E+	V-	N	N	ø	ø*R	V+	T*	N	N	.	.	.	LM725D	0	LM725J-14
TO5-8/1M	T	E-	E+	V-	ø	ø*R	V+	T*	.	.	.	.	.	.	.	.	.	UA725HM	0	LM725H
DIL-14/1M	E+	N	A2	A*2	V-	N	R	R*	N	V+	A1	A*1	N	E-	.	.	SN72733J	UA733DC	0	LM733CD
TO5-10/1M	E-	E+	A2	A*2	V-	R	R*	V+	A1	A*1	.	.	.	.	.	.	SN72733L	UA733HC	0	LM733CH
DIL-14/1C	E+	N	A2	A*2	V-	N	R	R*	N	V+	A1	A*1	N	E-	.	.	SN72733J	UA733DC	0	LM733CJ
DIL-14/1P	E+	N	A2	A*2	V-	N	R	R*	N	V+	A1	A*1	N	E-	.	.	SN72733J	UA733DC	0	LM733CN

Appendix A

Explanatory notes to tabulations

The general layout plan of the information in the tables of this compendium should be immediately evident from the data tabulation explanatory chart set out overleaf.

Supporting Appendices with additional information are:

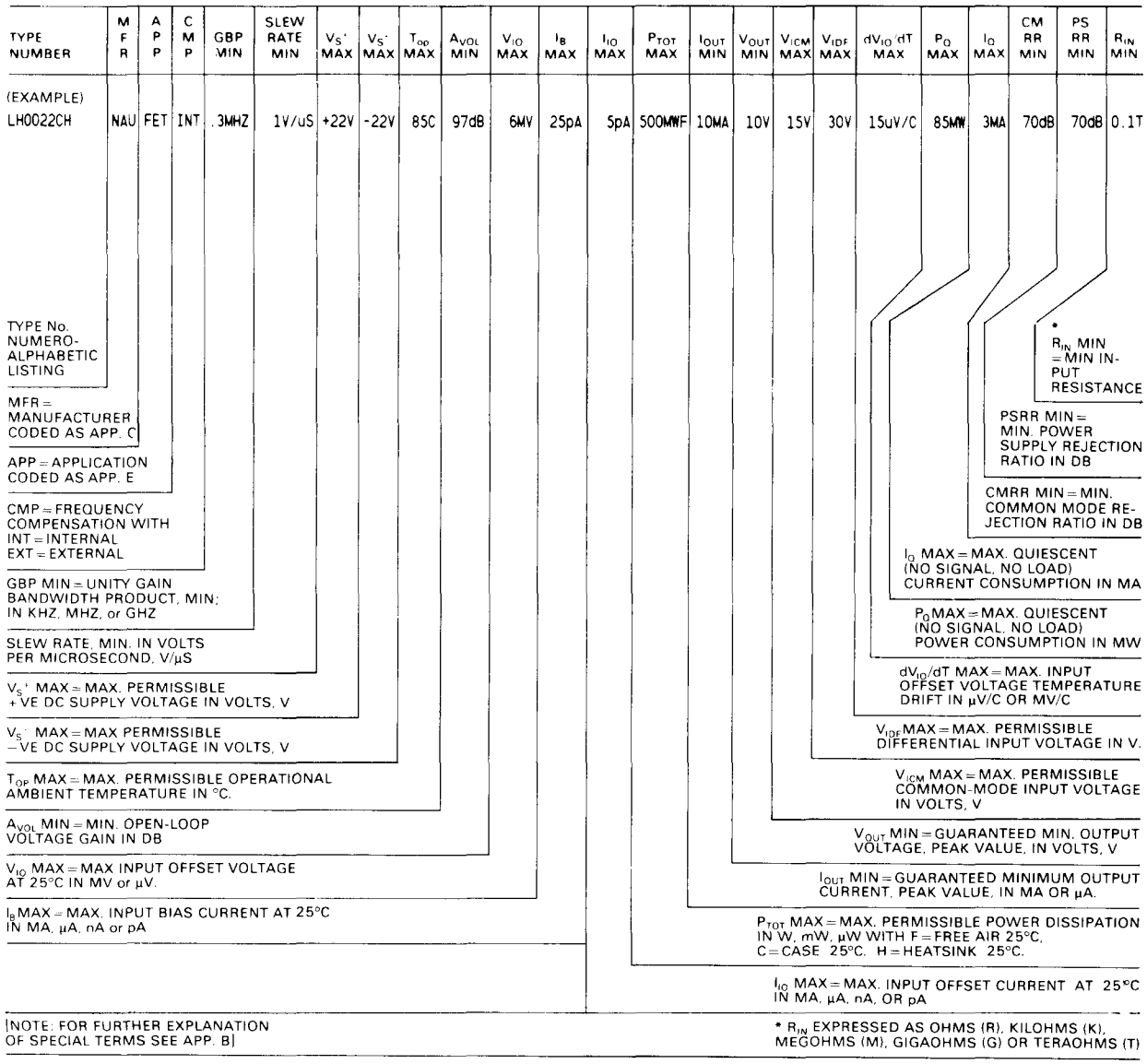
App. B Glossary of *Opamp Terms*
App. C Tabulation *Codes for Manufacturers*
App. D IC Manufacturers' *House Numbers*
App. E Tabulation *Codes for Applications*
App. F *Case Outline and Leadout Diagrams*
App. G Codes for *Leadout Connections*

Unit symbols used in the tables are:

A = amperes
C = ° centigrade
dB = decibels
G = gigaohms (megohms x 10^3)
GHZ = gigahertz (megahertz x 10^3)
K = kilohms
KHZ = kilohertz
M = megohms
MA = milliamperes, mA
MAX = maximum
MHZ = megahertz
MIN = minimum
MV = millivolts
MWC = milliwatts, case at 25C
MWF = milliwatts, free air at 25C
MWH = milliwatts, heat sink, 25C
NA = nanoamps (microamps x 10^{-3})
NV = nanovolts (microvolts x 10^{-3})
PA = picoamps (microamps x 10^{-12})
R = ohms
T = teraohms (megohms x 10^6)
V = volts
WC = watts, case at 25C
WF = watts, free air at 25C
WH = watts, heatsink, 25C
μA = microamps
μS = microseconds
μV = microvolts
μW = microwatts
μWF = microwatts, free air at 25C

Where a unit symbol appears in the middle of a value, it indicates the position of the decimal point, e.g. 3K3 = 3·3K.

Appendix A


TYPE NUMBER
MFR
APP
CMP
GBP MIN
SLEW RATE MIN
V_S^+ MAX
V_S^- MAX
T_{op} MAX
A_{VOL} MIN
V_{IO} MAX
I_B MAX
I_{IO} MAX
P_{TOT} MAX
I_{OUT} MIN
V_{OUT} MIN
V_{ICM} MAX
V_{IDF} MAX
dV_{IO}/dT MAX
P_Q MAX
I_Q MAX
CMRR MIN
PSRR MIN
R_{IN} MIN
(EXAMPLE)
LH0022CH
NAU
FET
INT
.3MHZ
1V/uS
+22V
-22V
85C
97dB
6MV
25pA
5pA
500MWF
10MA
10V
15V
30V
15uV/C
85MW
3MA
70dB
70dB
0.1T
TYPE No. NUMERO-ALPHABETIC LISTING
MFR = MANUFACTURER CODED AS APP. C
APP = APPLICATION CODED AS APP. E
CMP = FREQUENCY COMPENSATION WITH INT = INTERNAL EXT = EXTERNAL
GBP MIN = UNITY GAIN BANDWIDTH PRODUCT, MIN; IN KHZ, MHZ, or GHZ
SLEW RATE, MIN. IN VOLTS PER MICROSECOND, V/μS
V_S^+ MAX = MAX. PERMISSIBLE +VE DC SUPPLY VOLTAGE IN VOLTS, V
V_S^- MAX = MAX PERMISSIBLE −VE DC SUPPLY VOLTAGE IN VOLTS, V
T_{OP} MAX = MAX. PERMISSIBLE OPERATIONAL AMBIENT TEMPERATURE IN °C.
A_{VOL} MIN = MIN. OPEN-LOOP VOLTAGE GAIN IN DB
V_{IO} MAX = MAX INPUT OFFSET VOLTAGE AT 25°C IN MV or μV.
I_B MAX = MAX. INPUT BIAS CURRENT AT 25°C IN MA, μA, nA or pA
[NOTE: FOR FURTHER EXPLANATION OF SPECIAL TERMS SEE APP. B]
I_{IO} MAX = MAX. INPUT OFFSET CURRENT AT 25°C IN MA, μA, nA, OR pA
P_{TOT} MAX = MAX. PERMISSIBLE POWER DISSIPATION IN W, mW, μW WITH F = FREE AIR 25°C, C = CASE 25°C. H = HEATSINK 25°C.
I_{OUT} MIN = GUARANTEED MINIMUM OUTPUT CURRENT, PEAK VALUE, IN MA OR μA.
V_{OUT} MIN = GUARANTEED MIN. OUTPUT VOLTAGE, PEAK VALUE, IN VOLTS, V
V_{ICM} MAX = MAX. PERMISSIBLE COMMON-MODE INPUT VOLTAGE IN VOLTS, V
V_{IDF} MAX = MAX. PERMISSIBLE DIFFERENTIAL INPUT VOLTAGE IN V.
dV_{IO}/dT MAX = MAX. INPUT OFFSET VOLTAGE TEMPERATURE DRIFT IN μV/C OR MV/C
P_Q MAX = MAX. QUIESCENT (NO SIGNAL, NO LOAD) POWER CONSUMPTION IN MW
I_Q MAX = MAX. QUIESCENT (NO SIGNAL, NO LOAD) CURRENT CONSUMPTION IN MA
CMRR MIN = MIN. COMMON MODE REJECTION RATIO IN DB
PSRR MIN = MIN. POWER SUPPLY REJECTION RATIO IN DB
* R_{IN} MIN = MIN INPUT RESISTANCE
* R_{IN} EXPRESSED AS OHMS (R), KILOHMS (K), MEGOHMS (M), GIGAOHMS (G) OR TERAOHMS (T)

LEFT HAND PAGE

For detailed explanations of column heading notations, see App. A.

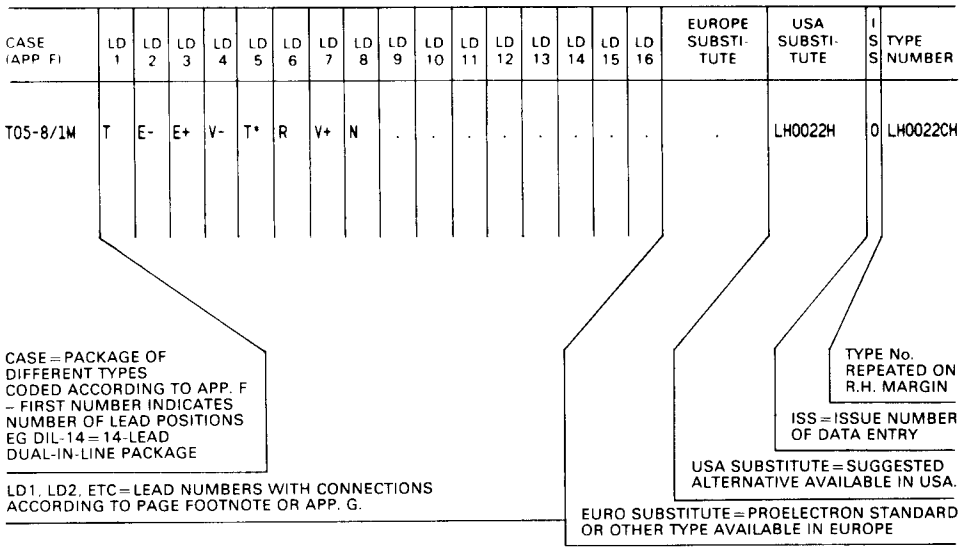
Also for ready references the more important abbreviations used in the column headings are listed below:

APP = application (codes at APP.E.)
CMRR = common mode rejection ratio
CMP = compensation (frequency)
dV_{IO}/dT = input offset voltage temperature drift
GBP = gain bandwidth product
I_B = input bias current
I_{IO} = input bias offset current
I_Q = quiescent supply current
MFR = manufacturer (codes at App.C.)
P_Q = quiescent power consumer
PSRR = power supply rejection ratio
V_{ICM} = common mode input voltage rating
V_{IDF} = differential input voltage rating
V_{IO} = input offset voltage
V_S = dc supply voltage

RIGHT HAND PAGE

Lead out coding summary (details at APP.G.) for different cases (APP.F.)

A = gain adjust
B = bias adjust
C = case
E− = inverting input
E+ = non-inverting input
F,F* = input frequency compensation
G = ground
J = high level input
K = output, open collector
L = output, open emitter
M = metal case
N = not connected
Q = special terminal
R,R* = outputs
S = strobe
T,T* = offset balance
V+ = +ve dc supply
V− = −ve dc supply
W = guard ring
X = blank position, no lead
++ = +ve supplementary dc supply
−− = −ve supplementary dc supply
ϕ,ϕ* = output frequency compensation



Appendix C
Tabulation Codes for Manufacturers

ADU **Advanced Micro Devices Inc.,**
901 Thompson Pl., Sunnyvale, CA 94086, USA

ANG **Analog Devices Ltd,**
Central Ave., East Molesey, KT8 9BR, Surrey, UK

ANU **Analog Devices Inc.,**
P.O. Box 280, Norwood, Mass., 02062

BLG **Bell & Howell Ltd,**
Lennox Road, Basingstoke, Hants, UK

BLU **Bell & Howell** (Control Products Divison),
706 Bostwick Ave, Bridgeport, Conn. 06605, USA

BUG **Burr-Brown International Ltd,**
17 Exchange Rd, Watford, WQD1 7EB, Herts., UK

BUU **Burr-Brown Research Corp.,**
P.O. Box 11400, Tucson, AZ. 85734, USA

CMG **Computing Techniques Ltd,**
Brookers Rd, Billingshurst, Sussex, RH14 9RZ, UK

DAG **Datel UK Ltd,**
Stephenson Close, Portway Ind. Estate, Andover, Hants, UK

DAU **Datel Systems Inc.,**
1020 Turnpike St., Canton, MA 02021, USA

FAG **Fairchild Camera & Instrument (UK) Ltd,**
230 High St., Potters Bar, Herts., UK

FAU **Fairchild Semiconductor**
464 Ellis St., Mountain View, CA 94042, USA

FEG **Ferranti Ltd,** (Electronic Department),
Gem Mill, Chadderton, Oldham, Lancs., OL9 8NP, UK

FUJ **Fujitsu Ltd,**
1015 Kamikodanaka, Kawasaki, Japan

HAG **Harris Semiconductor (Memec) Ltd,**
The Firs, Whitchurch, Nr. Aylesbury, Bucks., HP22 4JU, UK

HAU **Harris Semiconductor**
P.O. Box 883, Melbourne, FL, 32901, USA

HIJ **Hitachi Ltd** (Semiconductor and IC Div.),
1450 Josuihonimachi, Kodaira City, Tokyo, Japan

ING **Intersil Inc.,**
8 Tessa Rd, Richfield Trading Estate, Reading, Berks., UK

INU **Intersil Inc.,**
10900 N. Tantau Ave, Cupertino, CA, 95014, USA

ITG **ITT Semiconductors**
Maidstone Rd, Foots Cray, Sidcup, Kent, DA14 5HT, UK

ITU **ITT Semiconductors**
74 Commerce Way, Woburn, MA, 01801, USA

MNG **Mitsubishi Shoji Kaisha Ltd,**
Bow Bells House, Bread St., London, EC4, UK

MNJ **Mitsubishi Electric Corp.,**
2–12 Marunouchi, Chiyoda-ku, Tokyo, Japan

MTG **Motorola Ltd** (Semiconductor Products Div.),
York House, Empire Way, Wembley, Middlesex, HA9 0PR, UK

MTU **Motorola Semiconductor Products Inc.,**
5005 E. McDowell Road, Phoenix, AZ, 85008, USA

MUG **Mullard Ltd,**
Mullard House, Torrington Place, London, WC1E 7HD, UK

NAG **National Semiconductor (UK) Ltd,**
Harpur Centre, Bedford, MK40 3LF, UK

NAU **National Semiconductor Corp.,**
2900 Semiconductor Drive, Santa Clara, CA, 95051, USA

NIJ **Nippon Electric Co. Ltd,**
1753 Shimonumabe, Nakahara-ku, Kawasaki, Japan

OAU **Opamp Labs Inc.,**
1033 N. Sycamore Ave., Los Angeles, CA 90038, USA

OBS Obsolete – no longer commercially available.

OTU **Optical Electronics Inc.,**
P.O. Box 11140, Tucson, AZ, 85734, USA

PLG **Plessey Semiconductors,**
Cheney Manor, Swindon, Wilts., SN2 2QW, UK

PRG **Precision Monolithics** (Bourns Trimpot Ltd)
17/27 High St., Hounslow, Middlesex, UK

PRU **Precision Monolithics (Bourns) Inc.,**
1500 Space Park Drive, Santa Clara, CA, 95050, USA

RAG **Raytheon Semiconductor**
The Pinnacles, Harlow, Essex, CM19 5BB, UK

RAU **Raytheon Semiconductor,**
350 Ellis Street, Mountain View, CA, 94042, USA

RCG **RCA (Great Britain) Ltd,**
Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex, UK

RCU **RCA Solid State Division**
Route 202, Somerville, NJ, 08876, USA

SAJ **Sanken Electric Co. Ltd,**
1-22-8 Nishi-Ikebukuro, Toshima-Ku, Tokyo, Japan

SGG	**SGS-ATES (UK) Ltd,** Planar House, Walton Street, Aylesbury, Bucks., UK
SGI	**SGS-ATES Componenti Spa,** Via Olivetti, 2 Agrate Brianza, 20041, Milan, Italy
SHG	**Shindengen Hyokuto Boeki Haisha Ltd,** St. Alphage House, Fore St., London, EC2Y 5DA, UK
SHJ	**Shindengen Electric Mfg Co., Ltd,** New Ohtemachi Bldng, 2–1, 2-chome, Ohtemachi, Chiyoda-ku, Tokyo, Japan
SIG	**Siemens Ltd,** Great West Road, Brentford, Middlesex, TW8 9DG, UK
SIW	**Siemens Aktiengesellschaft,** Richard-Strauss-Strasse 76, D-8000 Munchen 2, Postfach 202109, W. Germany
SJG	**Signetics International Corporation** Yeoman House, 63 Croydon Rd, London, SE20, UK
SJU	**Signetics Corp.,** 811 East Arques Ave, Sunnydale, CA. 94086, USA
SKU	**Silicon General Inc.,** 7382 Bolsa Avenue, Westminster, CA, 92683, USA
SLG	**Siliconix Ltd,** 30A High St., Thatcham, Newbury, Berks., RG13 4JG, UK
SLU	**Siliconix Incorporated,** 2201 Laurelwood Road, Santa Clara, CA, 95054, USA
SOJ	**Sony Semiconductor Corp.,** 14–1, Asa hi-sho 4, Atsuigi-shi, Kanagawa-ken, 243, Japan
SPG	**Sprague Electric (UK) Ltd,** 159 High St., Yiewsley, W. Drayton, Middlesex, UB7 7RY, UK
SPU	**Sprague Electric Company** (Semiconductor Div.), 115 Northeast Cutoff, Worcester, MA, 01606, USA
TDG	**Teledyne Semiconductor,** Heathrow House, Bath Road, Cranford, Hounslow, Middlesex, TW5 9QP, UK
TDU	**Teledyne (Amelco) Semiconductor,** 1300 Terra Bella Ave, Mountain View, CA, 94032, USA
TEB	**Teledyne-Philbrick,** Heathrow House, Bath Road, Cranford, Hounslow, Middlesex, TW5 9QP, UK
TEU	**Teledyne-Philbrick,** Allied Drive at Route 128, Dedham, MA, 02026, USA
TGG	**Texas Instruments Ltd,** Manton Lane, Bedford, UK
TGU	**Texas Instruments Inc.** (Components Group), P.O. Box 5012, Dallas, Texas, 75222, USA
THF	**Thomson-CSF (Sescosem),** 50 Rue Jean Pierre Timbaud, BP 120, 92403, Courbevoie, France
THG	**Thomson-CSF (UK) Ltd,** Ringway House, Bell Rd, Daneshill, Basingstoke, Hants., RG24 0QG, UK.
TKJ	**Tokyo Sanyo Electric Co. Ltd** (Semiconductor Div.), Oizumachi, Oragun, Gumma, Japan
TOG	**Toshiba (UK) Ltd,** Toshiba House, Great South West Rd, Feltham, Middlesex, UK
TOJ	**Toshiba (Tokyo Shibaura) Electric Co.,** 2–1, 5-chome, Ginza Chuo-ku, Tokyo, Japan
TRU	**Transitron Electronic Corp.,** 168 Albion St., Wakefield, MA, 01881, USA
ZEU	**Zeltex Inc.,** 940 Detroit Ave, Concord, CA, 94518, USA

Appendix D
IC Manufacturers' House Numbers

(General Note: Manufacturers often adopt their own 'in-house' serial numbering for their ICs. Listed below are the initial letters of numerical series used by different manufacturers.)

AD	Analog Devices
ADO	Analog Devices
AM	Advanced Micro Devices; Datel
AMD	Advanced Micro Devices
AMLM	Advanced Micro Devices
AMSSS	Advanced Micro Devices
AMU	Advanced Micro Devices
C	Bell & Howell
CA	RCA
CIA	Teledyne-Philbrick
CMP	Precision Monolithics
CN	Ferranti
DA	Teledyne-Philbrick
EP	Teledyne-Philbrick
ESL	Teledyne-Philbrick
FSL	Teledyne-Philbrick
FSS	Ferranti
HA	Harris
HEPC	Motorola
ICH	Intersil
ICL	Intersil
JM	Fairchild
JSF	Thomson-CSF
L	Analog Devices; SGS-ATES
LA	Teledyne-Philbrick
LF	National Semiconductor
LH	National Semiconductor
LM	National Semiconductor
M	Mitsubishi
MC	Motorola Semiconductors
MCC	Motorola Semiconductors
MCCF	Motorola Semiconductors
MCE	Motorola Semiconductors
MCH	Motorola Semiconductors
MIC	ITT Semiconductors
MLF	Motorola; Teledyne-Philbrick
MLM	Motorola Semiconductors
MLMC	Motorola Semiconductors
MONO-OP	Precision Monolithics
N	Signetics; Mullard
NC	General Instruments (obs.)
NE	Signetics; Mullard
NH	National Semiconductor
OP	Precision Monolithics
P	Teledyne-Philbrick
PF	Teledyne-Philbrick
PG	General Instruments (obs.)
PP	Teledyne-Philbrick
RA	Radiation (now Harris)
RC	Raytheon
RL	Raytheon
RM	Raytheon
RSN	Raytheon
RV	Raytheon
S	Signetics
SA	Teledyne-Philbrick
SE	Signetics; Mullard
SFC	Thomson-CSF
SG	Silicon General
SH	Fairchild
SK	RCA
SL	Plessey: Teledyne-Philbrick
SN	Texas Instruments
SP	Teledyne-Philbrick
SQ	Teledyne-Philbrick
SSS	Precision Monolithics
SU	Signetics; Mullard
T	Teledyne-Philbrick Transitron
TA	AEG-Telefunken
TAA	Proelectron Standard
TBA	Proelectron Standard
TBB	Proelectron Standard
TBC	Proelectron Standard
TBE	Proelectron Standard
TCA	Proelectron Standard
TDA	Proelectron Standard
TDB	Proelectron Standard
TDC	Proelectron Standard
TDE	Proelectron Standard
TL	AEG-Telefunken
TOA	Transitron
TSC	Transitron
U	Fairchild
ULN	Sprague
ULS	Sprague
USL	Teledyne-Philbrick
ZA	Zeltex
ZEL	Zeltex
ZLD	Ferranti
ZN	Ferranti
μA	Fairchild

Appendix E
Tabulation Codes for Applications

BDO	Balanced differential-output amplifier
CDA	Current-difference amplifier
CHP	Chopper-stabilized amplifier
CPR	DC comparator
DBD	Dual balanced differential-output amplifier
DCP	Dual Comparator
DFE	Dual fet-input opamp
DGK	Dual general purpose opamp
DGU	Dual general-purpose uncompensated opamp
DHS	Dual high-slew-rate opamp
DLN	Dual low-noise opamp
DPI	Dual precision instrumentation amplifier
DPR	Dual programmable opamp
DSB	Dual super-beta opamp
FET	Fet-input opamp
GPK	General-purpose, internally-compensated, opamp
GPU	General-purpose, uncompensated, opamp
HCO	High current output opamp
HIR	High input resistance opamp
HPO	High power output opamp
HSR	High slew rate opamp
HVO	High voltage output opamp
LBC	Low input bias current opamp
LCD	Low input offset current drift opamp
LNA	Low noise opamp
LOC	Low input offset current opamp
LOV	Low input offset voltage opamp
LQP	Low quiescent power opamp
LVD	Low input offset voltage drift opamp
MWB	Medium-wideband opamp
OTA	Operational transconductance amplifier
PAA	Parametric amplifier
PIA	Precision instrumentation amplifier
PRA	Programmable opamp
QCD	Quad current-difference amplifier
QCP	Quad comparator
QFE	Quad fet-input opamp
QGK	Quad general-purpose, internally-compensated, opamp
QGU	Quad general-purpose, uncompensated, opamp
QLQ	Quad low-quiescent-power opamp
QPI	Quad precision instrumentation amplifier
QPR	Quad programmable opamp
QSB	Quad super-beta opamp
SBA	Super-beta opamp
TCP	Triple comparator
TFE	Triple fet-input opamp
TGK	Triple general-purpose, internally compensated, opamp
TGU	Triple general-purpose, uncompensated, opamp
TLN	Triple low-noise opamp
TLP	Triple low-quiescent-power opamp
TOT	Triple operational transconductance amplifier
TPI	Triple precision instrumentation amplifier
TPR	Triple programmable opamp
TSB	Triple super-beta opamp
VFA	Voltage-follower amplifier
WBA	Wide-band opamp
XHG	Extra-high-gain opamp
XLP	Extra-low quiescent power opamp
XSR	Extra-high slew rate opamp
XWB	Extra-wide-band opamp

Appendix G
Codes for Leadout Connections

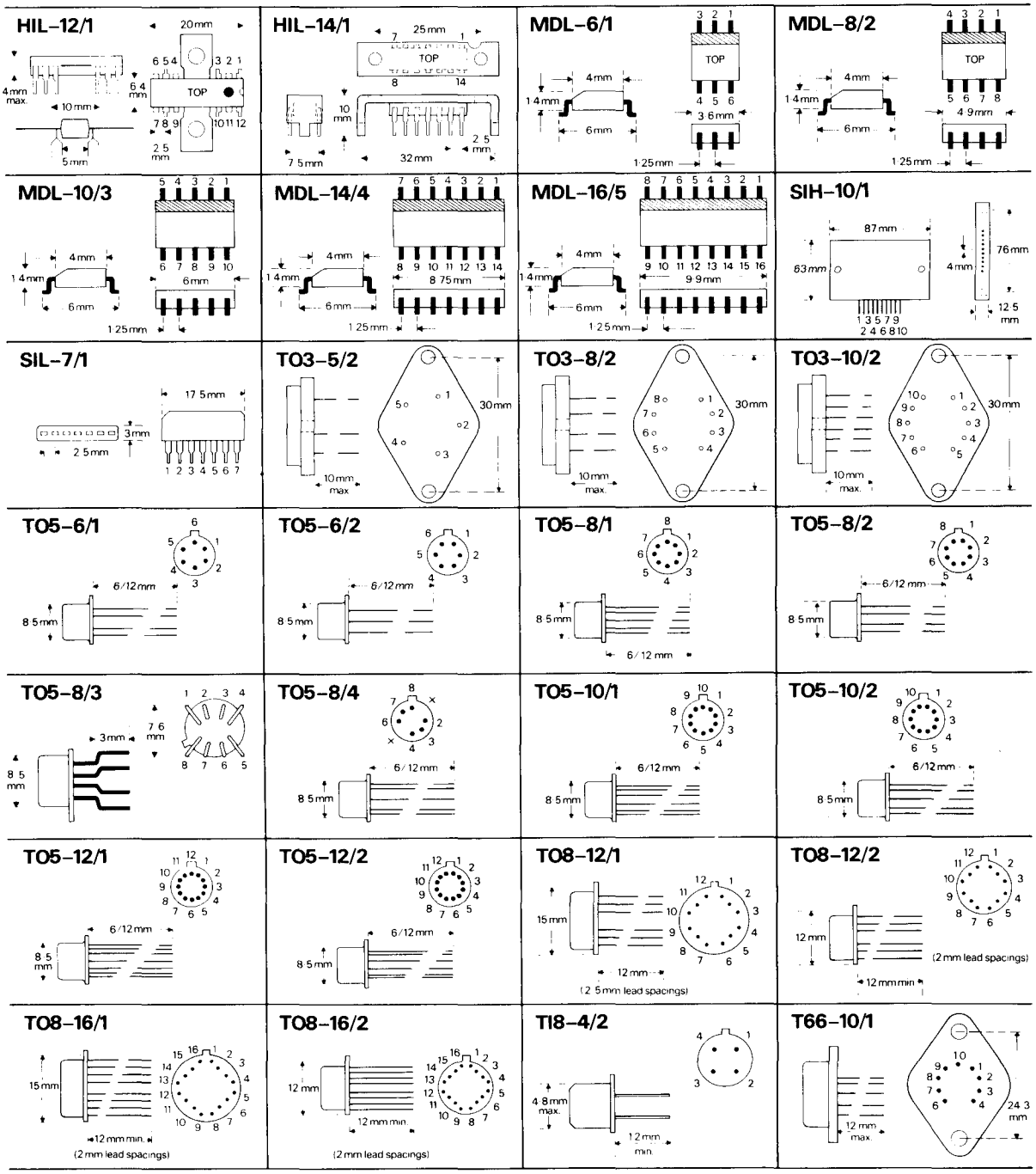
I: Connection Codes in Serial Order

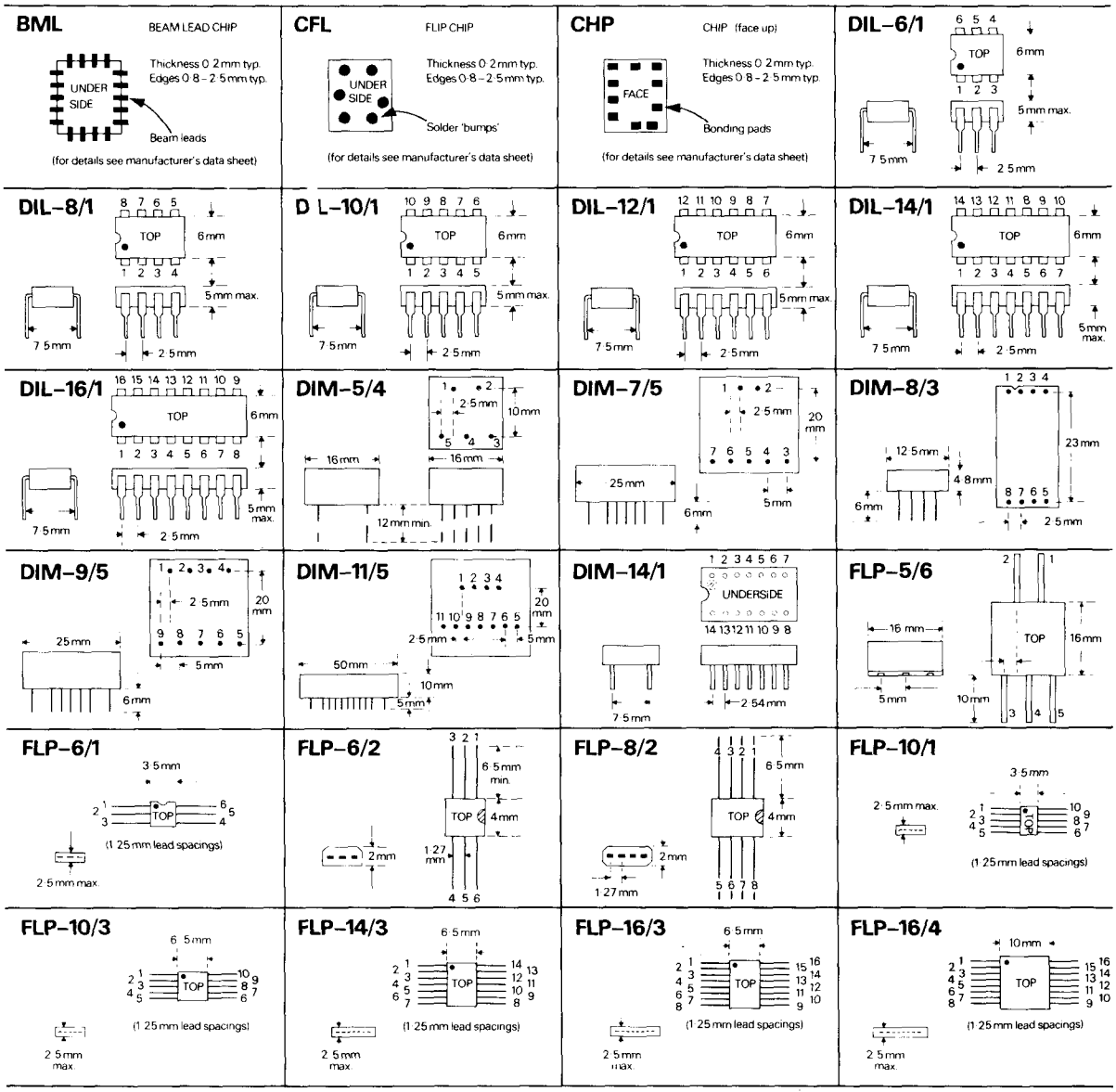
A = Gain adjust, 1
A* = Gain adjust, 2
B = Bias adjust or set
C = Case, package, screen
E+ = Input, non-inverting, low-level
E− = Input, inverting, low-level
F = Input frequency compensation, 1
F* = Input frequency compensation, 2
G = Ground, common, earth, zero volts
J+ = Input, non-inverting, high-level
J− = Input, inverting, high-level
K = Output, open collector
L = Output, open emitter
M = Metal casing
N = Not connected, i.e. isolated lead
Q = Special terminal (consult manufacturer's data)
R = Output, 1
R* = Output, 2
S = Strobe
T = Offset balance, trim or null, 1
T* = Offset balance, trim or null, 2
V+ = +ve dc supply
V− = −ve dc supply
W = Guard ring
X = Blank position, lead omitted
++ = +ve supplementary dc supply
−− = −ve supplementary dc supply
φ = Output frequency compensation, 1
φ* = Output frequency compensation, 2

II: Lead Assignments in Alphabetical Order

Balance, offset, 1 = T
Balance, offset, 2 = T*
Bias adjust = B
Blank position, without lead = X
Case = C
Compensation, input, 1 = F
Compensation, input, 2 = F*
Compensation, output, 1 = φ
Compensation, output, 2 = φ*
DC supply, +ve = V+
DC supply, −ve = V−
Frequency compensation, input, 1 = F
Frequency compensation, input, 2 = F*
Frequency compensation, output, 1 = φ
Frequency compensation, output, 2 = φ*
Gain adjust, 1 = A
Gain adjust, 2 = A*
Ground = G
Guard ring = W
Input, inverting, high-level = J
Input, non-inverting, high-level = J+
Input, inverting, low-level = E−
Input, non-inverting, low-level = E+
Input offset voltage, adjust, 1 = T
Input offset voltage, adjust, 2 = T*
Lead omitted, blank position = X
Lead in position but not connected = N
Metal case = M
Not connected, but lead in position = N
Null, offset, 1 = T
Null, offset, 2 = T*
Offset voltage adjust, 1 = T
Offset voltage adjust, 2 = T*
Output, 1 = R
Output, 2 = R*
Output, open-collector = K
Output, open-emitter = L
Package = C
Special purpose terminal (data sheet to be consulted) = Q
Strobe = S
Supply, dc, +ve = V+
Supply, dc, −ve = V−
Supply, dc, supplementary, +ve = ++
Supply, dc, supplementary, −ve = −−
Trim (offset voltage), 1 = T
Trim (offset voltage), 2 = T*

Appendix F


HIL-12/1
HIL-14/1
MDL-6/1
MDL-8/2
MDL-10/3
MDL-14/4
MDL-16/5
SIH-10/1
SIL-7/1
TO3-5/2
TO3-8/2
TO3-10/2
TO5-6/1
TO5-6/2
TO5-8/1
TO5-8/2
TO5-8/3
TO5-8/4
TO5-10/1
TO5-10/2
TO5-12/1
TO5-12/2
TO8-12/1
TO8-12/2
TO8-16/1
TO8-16/2
TI8-4/2
T66-10/1
TOP
(2 mm lead spacings)
(2.5 mm lead spacings)


BML
BEAM LEAD CHIP
Thickness 0·2mm typ.
Edges 0·8 - 2·5mm typ.
UNDER SIDE
Beam leads
(for details see manufacturer's data sheet)
CFL
FLIP CHIP
Thickness 0·2mm typ.
Edges 0·8 - 2·5mm typ.
UNDER SIDE
Solder 'bumps'
(for details see manufacturer's data sheet)
CHP
CHIP (face up)
Thickness 0·2mm typ.
Edges 0·8 - 2·5mm typ.
FACE
Bonding pads
(for details see manufacturer's data sheet)
DIL-6/1
DIL-8/1
DIL-10/1
DIL-12/1
DIL-14/1
DIL-16/1
DIM-5/4
DIM-7/5
DIM-8/3
DIM-9/5
DIM-11/5
DIM-14/1
FLP-5/6
FLP-6/1
FLP-6/2
FLP-8/2
FLP-10/1
FLP-10/3
FLP-14/3
FLP-16/3
FLP-16/4
TOP
UNDERSIDE
6mm
5mm max.
2·5mm
7·5mm
(1·25mm lead spacings)
2·5mm max.