TYPE NUMBER	MFR	APP	CMP	GBP MIN	SLEW RATE MIN	V_S^+ MAX	V_S^- MAX	T_{up} 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_Q MAX	CMRR MIN	PSRR MIN	R_{IN} MIN
LM312D	NAU	SBA	INT	.	.	+18V	-18V	70C	88dB	7.5MV	7NA	1NA	500MWF	1MA	13V	14V	14V	15uV/C	.	.8MA	80dB	80dB	10M
LM312F	NAU	SBA	INT	.	.	+18V	-18V	70C	88dB	7.5MV	7NA	1NA	500MWF	1MA	13V	14V	14V	15uV/C	.	.8MA	80dB	80dB	10M
LM312H	NAU	SBA	INT	.	.	+18V	-18V	70C	88dB	7.5MV	7NA	1NA	500MWF	1MA	13V	14V	14V	15UV/C	.	.8MA	80dB	80dB	10M
LM316AD	NAU	LBC	INT	.	.	+20V	-20V	70C	92dB	3MV	50pA	15pA	500MWF	1MA	13V	15V	14V	.	.	.6MA	80dB	80dB	2G
LM316AF	NAU	LBC	INT	.	.	+20V	-20V	70C	92dB	3MV	50pA	15pA	500MWF	1MA	13V	15V	14V	.	.	.6MA	80dB	80dB	2G
LM316AH	NAU	LBC	INT	.	.	+20V	-20V	70C	92dB	3MV	50pA	15pA	500MWF	1MA	13V	15V	14V	.	.	.6MA	80dB	80dB	2G
LM316D	NAU	LBC	INT	.	.	+20V	-20V	70C	86dB	10MV	150pA	50pA	500MWF	1MA	13V	15V	14V	.	.	.8MA	80dB	80dB	300M
LM316F	NAU	LBC	INT	.	.	+20V	-20V	70C	86dB	10MV	150pA	50pA	500MWF	1MA	13V	15V	14V	.	.	.8MA	80dB	80dB	300M
LM316H	NAU	LBC	INT	.	.	+20V	-20V	70C	86dB	10MV	150pA	50pA	500MWF	1MA	13V	15V	14V	.	.	.8MA	80dB	80dB	300M
LM318D	NAU	XSR	INT	.	50V/uS	+20V	-20V	70C	88dB	10MV	500NA	200NA	500MWF	6MA	12V	15V	1V	.	.	8MA	70dB	65dB	500K
LM318F	ADU	XSR	INT	.	50V/uS	+20V	-20V	70C	88dB	10MV	500NA	200NA	500MWF	6MA	12V	15V	1V	.	.	8MA	70dB	65dB	500K
LM318H	NAU	XSR	INT	.	50V/uS	+20V	-20V	70C	88dB	10MV	500NA	200NA	500MWF	6MA	12V	15V	1V	.	.	8MA	70dB	65dB	500K
LM318N	NAU	XSR	INT	.	50V/uS	+20V	-20V	70C	88dB	10MV	500NA	200NA	500MWF	6MA	12V	15V	1V	.	.	8MA	70dB	65dB	500K
LM319A	MUG	DCP	INT	.	.	+18V	-18V	70C	78dB	8MV	1uA	0.2uA	500MWF	.	.	15V	5V	.	.	2MA	.	.	.
LM319D	NAU	DCP	INT	.	.	+18V	-18V	70C	78dB	8MV	1uA	0.2uA	500MWF	.	.	15V	5V	.	.	12MA	.	.	.
LM319F	MUG	DCP	INT	.	.	+18V	-18V	70C	78dB	8MV	1uA	0.2uA	500MWF	.	.	15V	5V	.	.	12MA	.	.	.
LM319F	NAU	DCP	INT	.	.	+18V	-18V	70C	78dB	8MV	1uA	0.2uA	500MWF	.	.	15V	5V	.	.	12MA	.	.	.
LM319H	NAU	DCP	INT	.	.	+18V	-18V	70C	78dB	8MV	1uA	0.2uA	500MWF	.	.	15V	5V	.	.	12MA	.	.	.
LM319J	NAU	DCP	INT	.	.	+18V	-18V	70C	78dB	8MV	1uA	0.2uA	500MWF	.	.	15V	5V	.	.	12MA	.	.	.
LM319K	MUG	DCP	INT	.	.	+18V	-18V	70C	78dB	8MV	1uA	0.2uA	500MWF	.	.	15V	5V	.	.	12MA	.	.	.
LM319N	NAU	DCP	INT	.	.	+18V	-18V	70C	78dB	8MV	1uA	0.2uA	500MWF	.	.	15V	5V	.	.	12MA	.	.	.
LM319N(14)	MUG	DCP	INT	.	.	+18V	-18V	70C	78dB	8MV	1uA	0.2uA	500MWF	.	.	15V	5V	.	.	2MA	.	.	.
LM321AD	NAU	PIA	EXT	.	.	+20V	-20V	70C	22dB	0.4MV	15NA	0.5NA	500MWF	.	.	15V	15V	0.2uV/C	.	3MA	126dB	120dB	2M
LM321AF	NAU	PIA	EXT	.	.	+20V	-20V	70C	22dB	0.4MV	15NA	0.5NA	500MWF	.	.	15V	15V	0.2uV/C	.	3MA	126dB	120dB	2M
LM321AH	NAU	PIA	EXT	.	.	+20V	-20V	70C	22dB	0.4MV	15NA	0.5NA	500MWF	.	.	15V	15V	0.2uV/C	.	3MA	126dB	120dB	2M
LM321D	NAU	PIA	EXT	.	.	+20V	-20V	70C	22dB	1.5MV	18NA	2NA	500MWF	.	.	15V	15V	1uV/C	.	3MA	114dB	114dB	2M
LM321F	NAU	PIA	EXT	.	.	+20V	-20V	70C	22dB	1.5MV	18NA	2NA	500MWF	.	.	15V	15V	1uV/C	.	3MA	114dB	114dB	2M
LM321H	NAU	PIA	EXT	.	.	+20V	-20V	70C	22dB	1.5MV	18NA	2NA	500MWF	.	.	15V	15V	1uV/C	.	3MA	114dB	114dB	2M
LM324A	SJU	QGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	570MWF	.	.	16V	16V	35uV/C	.	2MA	65dB	65dB	.
LM324AD	ADU	QGK	INT	.	.	+16V	-16V	70C	88dB	3MV	100NA	30NA	900MWF	.	.	16V	16V	30uV/C	.	2MA	65dB	65dB	.
LM324AJ	NAU	QGK	INT	.	.	+16V	-16V	70C	88dB	3MV	100NA	30NA	900MWF	.	.	16V	16V	30uV/C	.	2MA	65dB	65dB	.
LM324AN	NAU	QGK	INT	.	.	+16V	-16V	70C	88dB	3MV	100NA	30NA	900MWF	.	.	16V	16V	30uV/C	.	2MA	65dB	65dB	.
LM324D	ING	QGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	900MWF	.	.	16V	16V	35uV/C	.	2MA	65dB	65dB	.
LM324D	MUG	QGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	.	.	.	16V	16V	35uV/C	.	2MA	65dB	65dB	.
LM324DDD	ING	QGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	900MWF	.	.	16V	16V	35uV/C	.	2MA	65dB	65dB	.
LM324F	SJU	QGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	900MWF	.	.	16V	16V	35uV/C	.	2MA	65dB	65dB	.
LM324J	NAU	QGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	900MWF	.	.	16V	16V	35uV/C	.	2MA	65dB	65dB	.
LM324N	NAU	QGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	900MWF	.	.	16V	16V	35uV/C	.	2MA	65dB	65dB	.
LM324N(14)	SJU	QGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	570MWF	.	.	16V	16V	35uV/C	.	2MA	65dB	65dB	.
LM324NPD	ING	QGK	INT	.	.	+16V	-16V	70C	88dB	7MV	250NA	50NA	900MWF	.	.	16V	16V	35uV/C	.	.	.	.	.
LM339A	MUG	QCP	EXT	.	.	+18V	-18V	70C	88dB	5MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339AA	MUG	QCP	EXT	.	.	+18V	-18V	70C	94dB	2MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339AF	MUG	QCP	EXT	.	.	+18V	-18V	70C	94dB	2MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339AJ	NAU	QCP	EXT	.	.	+18V	-18V	70C	94dB	2MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339AN(14)	MUG	QCP	EXT	.	.	+18V	-18V	70C	94dB	2MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339F	MUG	QCP	EXT	.	.	+18V	-18V	70C	88dB	5MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339J	NAU	QCP	EXT	.	.	+18V	-18V	70C	88dB	5MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339L	TDG	QCP	EXT	.	.	+18V	-18V	70C	88dB	5MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339N(14)	MUG	QCP	EXT	.	.	+18V	-18V	70C	88dB	5MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339AD	NAU	QCP	EXT	.	.	+18V	-18V	70C	94dB	2MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339ADDD	ING	QCP	EXT	.	.	+18V	-18V	70C	94dB	2MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339AN	NAU	QCP	EXT	.	.	+18V	-18V	70C	94dB	2MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339ANPD	ING	QCP	EXT	.	.	+18V	-18V	70C	94dB	2MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339D	NAU	QCP	EXT	.	.	+18V	-18V	70C	88dB	5MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339DDD	ING	QCP	EXT	.	.	+18V	-18V	70C	88dB	5MV	250NA	50NA	900MWF	6MA	.	18V	18V	.	.	2MA	.	.	.
LM339N	NAU	QCP	EXT	.	.	+18V	-18V	70C	88dB	5MV	250NA	50NA	800MWF	.	.	18V	18V	.	.	2MA	.	.	.
LM339NPD	ING	QCP	EXT	.	.	+18V	-18V	70C	88dB	5MV	250NA	50NA	800MWF	.	.	18V	18V	.	.	2MA	.	.	.
LM343D	NAU	HVO	INT	.3MHZ	1V/uS	+34V	-34V	70C	97dB	8MV	40NA	10NA	680MWF	4MA	20V	34V	68V	.	.	5MA	70dB	74dB	.
LM343H	NAU	HVO	INT	.3MHZ	1V/uS	+34V	-34V	70C	97dB	8MV	40NA	10NA	680MWF	4MA	20V	34V	68V	.	.	5MA	70dB	74dB	.
LM344D	NAU	HVO	EXT	.3MHZ	1V/uS	+34V	-34V	70C	97dB	8MV	40NA	10NA	680MWF	4MA	20V	34V	68V	.	.	5MA	70dB	74dB	.

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_c = 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_{id} = 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.I 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

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	IS	TYPE NUMBER
DIL-14/1M	N	T	W	E-	E+	W*	V-	N	F	R	V+	T*	N	N	.	.	.	LM212D	0	LM312D
FLP-10/3G	N	W	E-	E+	W*	V-	R	V+	T	T*	.	.	.	.	.	.	.	LM212F	0	LM312F
TO5-8/1M	T	E-	E+	V-	F	R	V+	T*	.	.	.	.	.	.	.	.	.	LM212H	0	LM312H
DIL-14/1M	N	T	W	E-	E+	W*	V-	N	F	R	V+	T*	N	N	.	.	.	LM216AD	0	LM316AD
FLP-10/3G	N	W	E-	E+	W*	V-	R	V+	T	T*	.	.	.	.	.	.	.	LM216AF	0	LM316AF
TO5-8/1M	T	E-	E+	V-	F	R	V+	T*	.	.	.	.	.	.	.	.	.	LM216AH	0	LM316AH
DIL-14/1M	N	T	W	E-	E+	W*	V-	N	F	R	V+	T*	N	N	.	.	MLM316D	LM216D	0	LM316D
FLP-10/3G	N	W	E-	E+	W*	V-	R	V+	T	T*	.	.	.	.	.	.	.	LM216F	0	LM316F
TO5-8/1M	T	E-	E+	V-	F	R	V+	T*	.	.	.	.	.	.	.	.	.	LM216H	0	LM316H
DIL-14/1M	N	N	T*F	E-	E+	V-	N	N	F*T	R	V+	ø	N	N	.	.	.	SN72318JA	0	LM318D
FLP-10/3C	N	T*F	E-	E+	V-	F*T	R	V+	ø	N	.	.	.	.	.	.	.	LM218F	0	LM318F
TO5-8/1M	T*F	E-	E+	V-	F*T	R	V+	ø	.	.	.	.	.	.	.	.	TDE0118CM	SN72318L	0	LM318H
DIL-8/1P	T*F	E-	E+	V-	F*T	R	V-	ø	.	.	.	.	.	.	.	.	.	SN72318JP	0	LM318N
DIL-14/1P	N	N	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	R1	N	N	.	.	TDB0119DP	LM319N	0	LM319A
DIL-14/1M	N	N	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	R1	N	N	.	.	TDB0119DP	LM219D	0	LM319D
DIL-14/1C	N	N	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	R1	N	N	.	.	TDB0119DP	LM319J	0	LM319F
FLP-10/3G	R1	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	.	.	.	.	.	.	.	LM219F	0	LM319F
TO5-10/1M	R1	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	.	.	.	.	.	.	TDB0119CM	LM219H	0	LM319H
DIL-14/1C	N	N	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	R1	N	N	.	.	TDB0119DP	LM219J	0	LM319J
TO5-10/1M	R1	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	.	.	.	.	.	.	TDB0119CM	LM319H	0	LM319K
DIL-14/1P	N	N	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	R1	N	N	.	.	TDB0119DP	LM219N	0	LM319N
DIL-14/1P	N	N	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	R1	N	N	.	.	TDB0119DP	LM319N	0	LM319N(14)
DIL-14/1M	N	R	W	E-	E+	W*	V-	N	T	T*	V+	R*	N	N	.	.	.	LM221AD	0	LM321AD
FLP-10/3G	R	W	E-	E+	W*	V-	T	T*	V+	R*	.	.	.	.	.	.	.	LM221AF	0	LM321AF
TO5-8/1M	R	E-	E+	V-	T	T*	V+	R*	.	.	.	.	.	.	.	.	.	LM221AH	0	LM321AH
DIL-14/1M	N	R	W	E-	E+	W*	V-	N	T	T*	V+	R*	N	N	.	.	.	LM321AD	0	LM321D
FLP-10/3G	R	W	E-	E+	W*	V-	T	T*	V+	R*	.	.	.	.	.	.	.	LM321AF	0	LM321F
TO5-8/1M	R	E-	E+	V-	T	T*	V+	R*	.	.	.	.	.	.	.	.	.	LM221H	0	LM321H
DIL-14/1P	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	MLM324J	LM324N	0	LM324A
DIL-14/1M	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	.	LM224AD	0	LM324AD
DIL-14/1C	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	.	LM224AD	0	LM324AJ
DIL-14/1P	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	.	LM224AD	0	LM324AN
DIL-14/1C	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	.	MLM324L	0	LM324D
MDL-14/4P	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	.	TDA0324D	0	LM324D
DIL-14/1C	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	MLM324L	LM324D	0	LM324DDD
DIL-14/1C	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	LM324N	LM324J	0	LM324F
DIL-14/1C	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	.	MLM324L	0	LM324J
DIL-14/1P	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	.	MLM324L	0	LM324N
DIL-14/1P	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	MLM324L	LM324N	0	LM324N(14)
DIL-14/1P	R1	E-1	E+1	V+	E+2	E-2	R2	R3	E-3	E+3	G	E+4	E-4	R4	.	.	MLM324L	LM324N	0	LM324NPD
DIL-14/1P	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	MLM339L	LM339D	0	LM339A
DIL-14/1P	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	MLM339AL	LM339AD	0	LM339AA
DIL-14/1C	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	MLM339AL	LM339AJ	0	LM339AF
DIL-14/1C	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	.	MLM339AL	0	LM339AJ
DIL-14/1P	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	MLM339AL	LM339AD	0	LM339AN(14)
DIL-14/1C	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	MLM339L	LM339J	0	LM339F
DIL-14/1C	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	.	MLM339L	0	LM339J
DIL-14/1P	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	MLM339L	LM339J	0	LM339L
DIL-14/1P	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	MLM339L	LM339D	0	LM339N(14)
DIL-14/1M	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	.	MLM339AL	0	LM339AD
DIL-14/1C	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	MLM339AL	LM339AD	0	LM339ADDD
DIL-14/1P	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	.	MLM339AL	0	LM339AN
DIL-14/1P	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	MLM339AL	LM339AN	0	LM339ANPD
DIL-14/1M	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	.	MLM339L	0	LM339D
DIL-14/1C	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	MLM339L	LM339D	0	LM339DDD
DIL-14/1P	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	.	MLM339L	0	LM339N
DIL-14/1P	R2	R1	V+	E-1	E+1	E-2	E+2	E+3	E-3	E-4	E+4	G	R4	R3	.	.	MLM339L	LM339N	0	LM339NPD
DIL-14/1M	N	N	T	E-	E+	V-	N	N	T*	R	V+	N	N	N	.	.	.	.	0	LM343D
TO5-8/1M	T	E-	E+	V-	T*	R	V+	N	.	.	.	.	.	.	.	.	.	MC1436G	0	LM343H
DIL-14/1M	N	N	FT	E-	E+	V-	N	N	T*	R	V+	F*	N	N	.	.	.	.	0	LM344D

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:

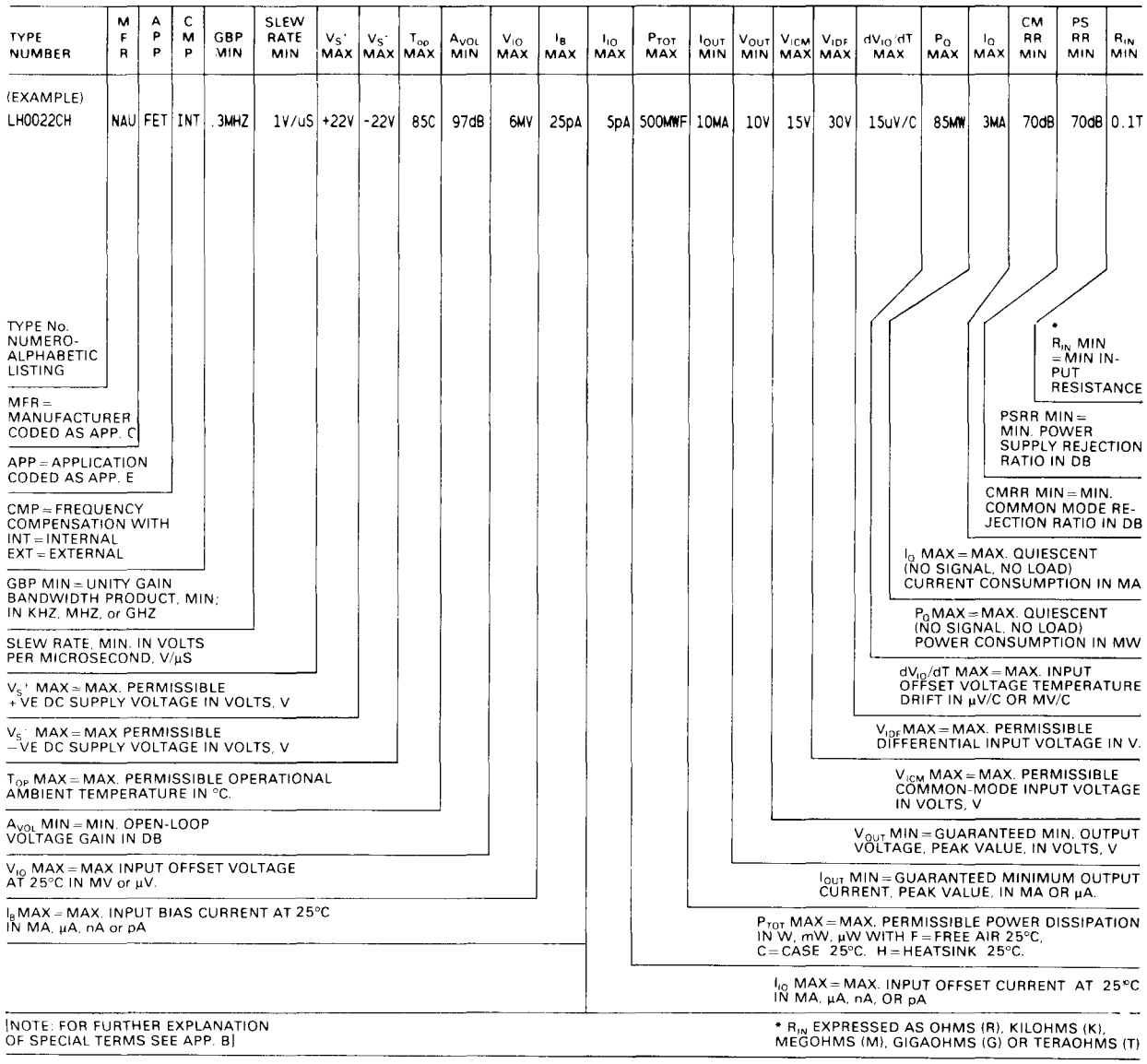
App. B Glossary of *Opamp Terms*
App. C Tabulation *Codes for Manufacturers*
App. D IC Manufacturers' *House Numbers*
App. E Tabulation *Codes for Applications*
App. F *Case Outline and Leadout Diagrams*
App. G Codes for *Leadout Connections*

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.

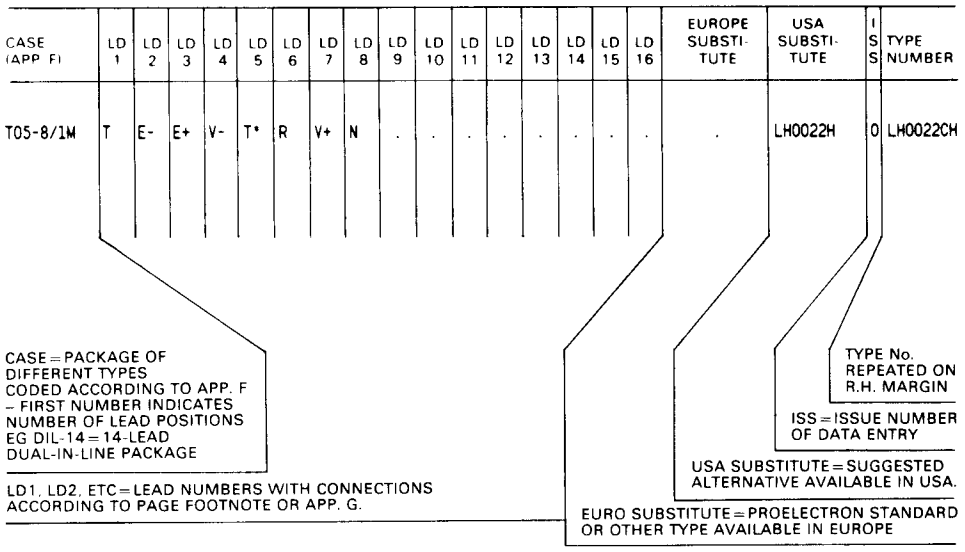
Also for ready references the more important abbreviations used in the column headings are listed below:

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

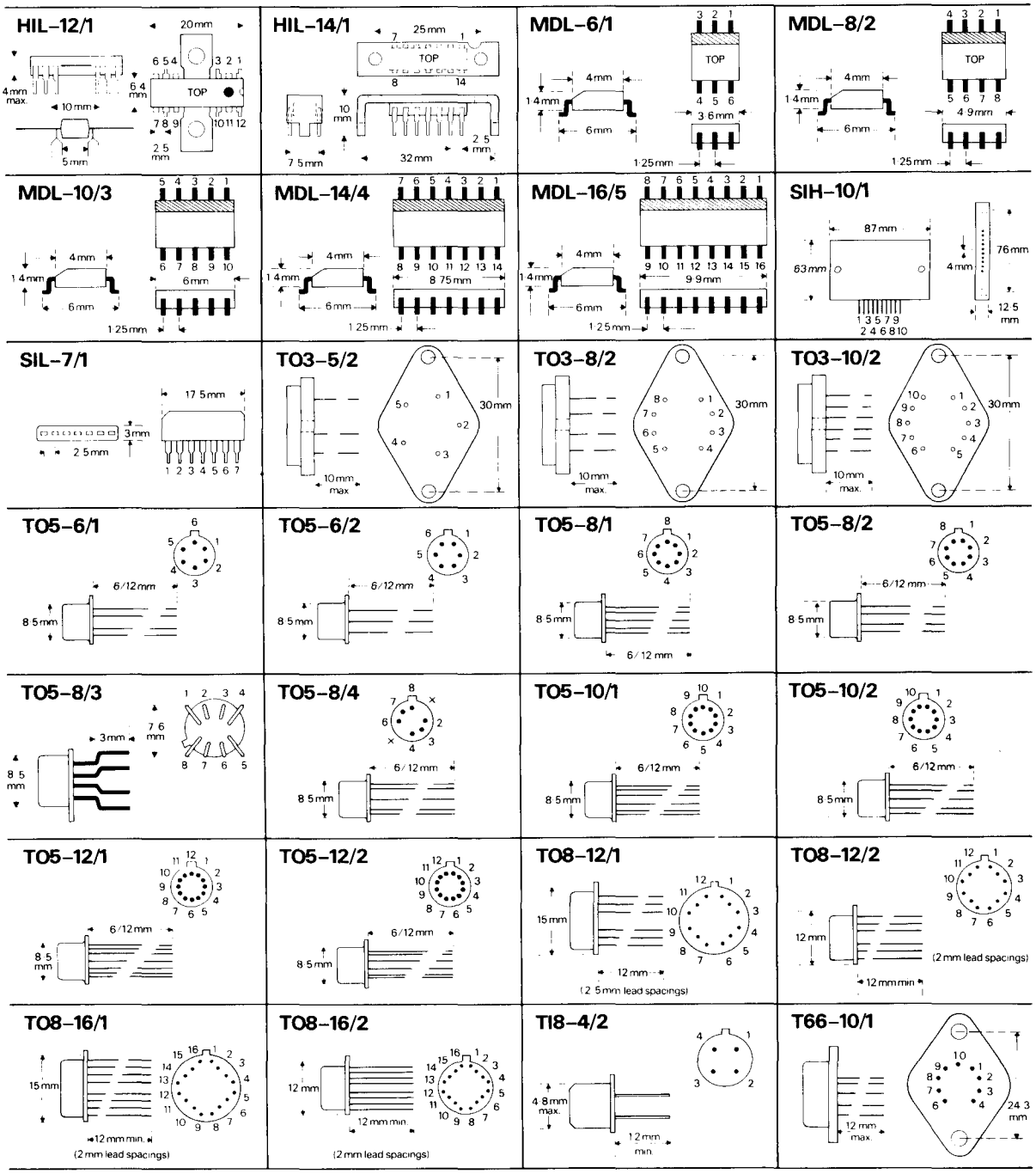
I: Connection Codes in Serial Order

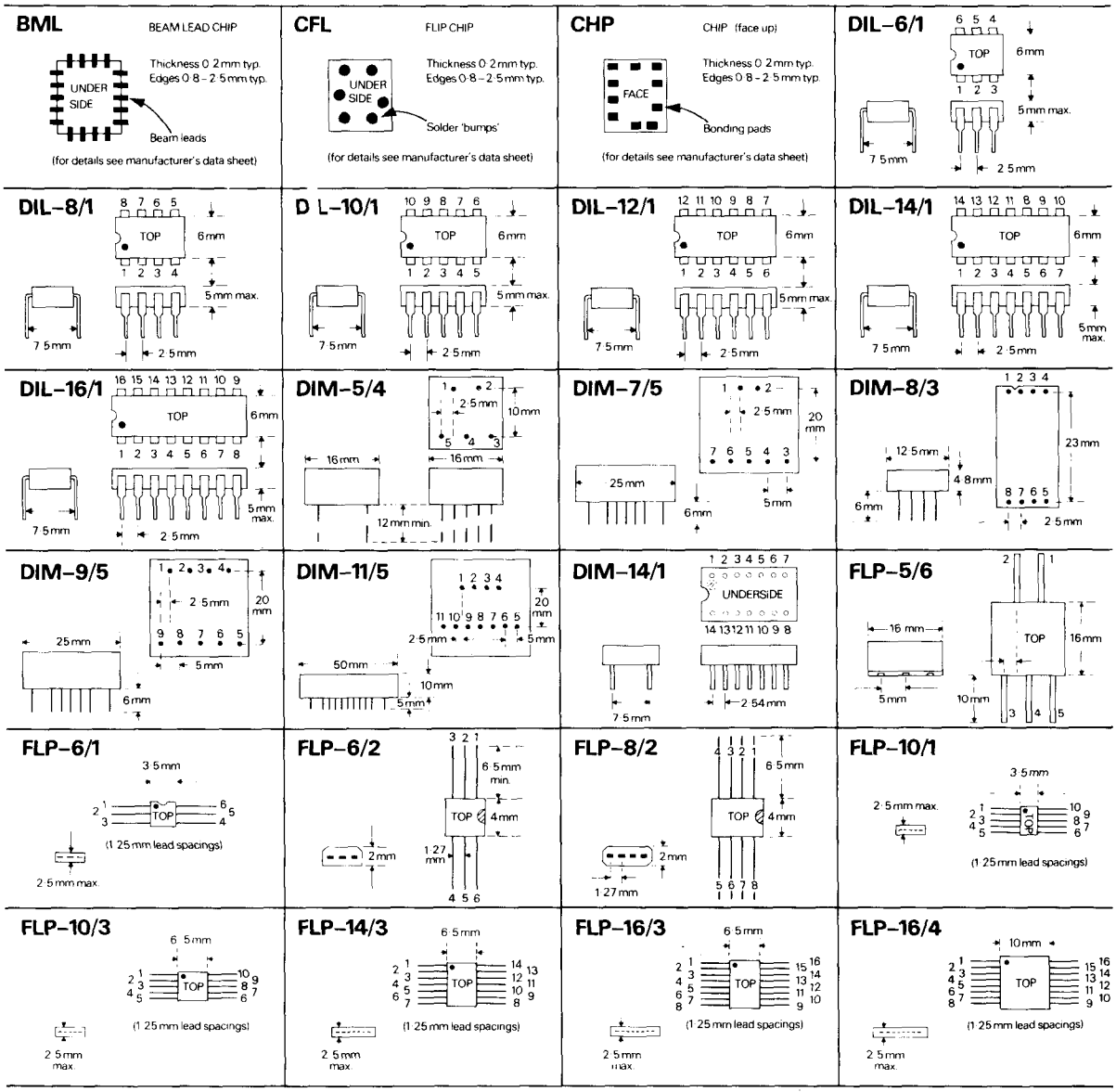
A = Gain adjust, 1
A* = Gain adjust, 2
B = Bias adjust or set
C = Case, package, screen
E+ = Input, non-inverting, low-level
E− = Input, inverting, low-level
F = Input frequency compensation, 1
F* = Input frequency compensation, 2
G = Ground, common, earth, zero volts
J+ = Input, non-inverting, high-level
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.