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_{IDR} = 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

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
TO5-8/1M	N	E-	E+	V-M	N	R	V+	N	.	.	.	.	.	.	.	.	SFC2207	LM207H	0	AMLM207H
DIL-14/1C	N	F	N	E-	E+	N	V-	N	N	R	V+	F*	N	N	.	.	UA208AD	LM208AD	0	AMLM208AD
FLP-10/3G	N	N	E-	E+	N	V-	R	V+	F*	F	.	.	.	.	.	.	.	LM208AF	0	AMLM208AF
TO5-8/1M	F	E-	E+	V-M	N	R	V+	F*	.	.	.	.	.	.	.	.	SFC2208A	LM208AH	0	AMLM208AH
DIL-14/1C	N	F	N	E-	E+	N	V-	N	N	R	V+	F*	N	N	.	.	UA208D	LM208D	0	AMLM208D
FLP-10/3G	N	N	E-	E+	N	V-	R	V+	F*	F	.	.	.	.	.	.	SFC2208PT	LM208F	0	AMLM208F
TO5-8/1M	F	E-	E+	V-M	N	R	V+	F*	.	.	.	.	.	.	.	.	SFC2208	LM208H	0	AMLM208H
DIL-14/1C	N	N	T	N	E+	V-	N	N	L	R	V+	T*	N	N	.	.	SN52110JA	LM210D	0	AMLM210D
FLP-10/3C	N	T	N	E+	V-	L	R	V+	T*	N	.	.	.	.	.	.	.	LM210F	0	AMLM210F
TO5-8/1M	T	N	E+	V-	L	R	V+	T*	.	.	.	.	.	.	.	.	MLM210G	LM210H	0	AMLM210H
DIL-14/1C	N	G	E+	E-	N	V-	T	T*S	R	N	V+	N	N	N	.	.	SN52111J	LM211D	0	AMLM211D
TO5-8/1M	G	E+	E-	V-	T	T*S	R	V+	.	.	.	.	.	.	.	.	SFC2211	LM211H	0	AMLM211H
DIL-14/1P	N	T	W	E-	E+	W*	V-	N	F	R	V+	T*	N	N	.	.	.	LM212D	0	AMLM212D
TO5-8/1M	T	E-	E+	V-	F	R	V+	T*	.	.	.	.	.	.	.	.	.	LM212H	0	AMLM212H
FLP-10/3C	N	W	E-	E+	W*	V-	R	V+	T	T*	.	.	.	.	.	.	.	LM212F	0	AM212-FLP
DIL-14/1C	N	T	W	E-	E+	W*	V-	N	F	R	V+	T*	N	N	.	.	MLM216AD	LM216AD	0	AMLM216AD
FLP-10/3C	N	W	E-	E+	W*	V-	R	V+	T	T*	.	.	.	.	.	.	.	LM216AF	0	AMLM216AF
TO5-8/1M	T	E-	E+	V-	F	R	V+	T*	.	.	.	.	.	.	.	.	.	LM216AH	0	AMLM216AH
DIL-14/1C	N	T	W	E-	E+	W*	V-	N	F	R	V+	T*	N	N	.	.	.	LM216D	0	AMLM216D
FLP-10/3C	N	W	E-	E+	W*	V-	R	V+	T	T*	.	.	.	.	.	.	.	LM216F	0	AMLM216F
TO5-8/1M	T	E-	E+	V-	F	R	V+	T*	.	.	.	.	.	.	.	.	.	LM216H	0	AMLM216H
DIL-14/1C	N	N	T*F	E-	E+	V-	N	N	F*T	R	V+	ø	N	N	.	.	SN52118JA	LM218D	0	AMLM218D
FLP-10/3C	N	T*F	E-	E+	V-	F*T	R	V+	ø	N	.	.	.	.	.	.	.	LM218F	0	AMLM218F
TO5-8/1M	T*F	E-	E+	V-	F*T	R	V+	ø	.	.	.	.	.	.	.	.	TDB0118CM	LM218H	0	AMLM218H
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	.	.	TDE0119DP	LM219D	0	AMLM219D
FLP-10/3C	R1	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	.	.	.	.	.	.	.	LM219F	0	AMLM219F
TO5-10/1M	R1	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	.	.	.	.	.	.	TDE0119CM	LM219H	0	AMLM219H
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	AMLM224AD
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	.	.	.	LM224D	0	AMLM224D
DIL-14/1C	N	N	G1	E+1	E-1	V-	R2	G2	E+2	E-2	V+	R1	N	N	.	.	MLM239AL	LM239AD	0	AMLM239AD
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	.	.	MLM239L	LM239D	0	AMLM239D
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	.	.	.	LM248D	0	AMLM248D
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	.	.	.	LM249D	0	AMLM249D
DIL-14/1P	FT	E-	E+	V-	T*	R	V+	F*	.	.	.	.	.	.	.	.	TDA0301D	LM301AD	0	AMLM301AD
TO5-8/1M	FT	E-	E+	V-M	T*	R	V+	F*	.	.	.	.	.	.	.	.	SFC2301AH	LM301AH	0	AMLM301AH
DIL-8/1P	FT	E-	E+	V-	T*	R	V+	F*	.	.	.	.	.	.	.	.	SFC2301ADC	LM301AN	0	AMLM301AN
DIL-14/1P	N	N	FT	E-	E+	V-	N	N	T*	R	V+	F*	N	N	.	.	.	LM301D	0	AMLM301D
FLP-10/3C	N	FT	E-	E+	V-	T*	R	V+	F*	N	.	.	.	.	.	.	.	LM301F	0	AMLM301F
TO5-8/1M	FT	E-	E+	V-M	T*	R	V+	F*	.	.	.	.	.	.	.	.	SFC2301A	LM301H	0	AMLM301H
DIL-14/1C	N	N	T	N	E+	V-	N	N	L	R	V+	T*	N	N	.	.	.	LM302D	0	AMLM302D
TO5-8/1M	T	N	E+	V-	L	R	V+	T*	.	.	.	.	.	.	.	.	UA302C	LM302H	0	AMLM302H
TO5-8/1M	G	E+	E-	V-M	S1	S2	R	V+	.	.	.	.	.	.	.	.	SN72306L	LM306H	0	AMLM306H
DIL-14/1P	N	N	N	E-	E+	V-	N	N	N	R	V+	N	N	N	.	.	SN72307JA	LM307D	0	AMLM307D
TO5-8/1M	N	E-	E+	V-M	N	R	V+	N	.	.	.	.	.	.	.	.	SFC2307	LM307H	0	AMLM307H
DIL-14/1P	N	F	N	E-	E+	N	V-	N	N	R	V+	F*	N	N	.	.	SN72308AJA	LM308AD	0	AMLM308AD
TO5-8/1M	F	E-	E+	V-M	N	R	V+	F*	.	.	.	.	.	.	.	.	SFC2308A	LM308AH	0	AMLM308AH
DIL-8/1P	F	E-	E+	V-	N	R	V+	F*	.	.	.	.	.	.	.	.	.	LM308AN	0	AMLM308AN
DIL-14/1P	N	F	N	E-	E+	N	V-	N	N	R	V+	F*	N	N	.	.	UA308D	LM308D	0	AMLM308D
TO5-8/1M	F	E-	E+	V-M	N	R	V+	F*	.	.	.	.	.	.	.	.	SFC2308	LM308H	0	AMLM308H
DIL-8/1P	F	E-	E+	V-	N	R	V+	F*	.	.	.	.	.	.	.	.	SFC2308DC	LM308N	0	AMLM308N
DIL-14/1P	N	N	T	N	E+	V-	N	N	L	R	V+	T*	N	N	.	.	SFC2310EC	LM310D	0	AMLM310D
FLP-10/3C	N	T	N	E+	V-	L	R	V+	T*	N	.	.	.	.	.	.	.	LM310F	0	AMLM310F
TO5-8/1M	T	N	E+	V-	L	R	V+	T*	.	.	.	.	.	.	.	.	SFC2310EC	LM310H	0	AMLM310H
DIL-8/1P	T	N	E+	V-	L	R	V+	T*	.	.	.	.	.	.	.	.	SFC2310DC	LM310N	0	AMLM310N
DIL-14/1P	N	G	E+	E-	N	V-	T	T*S	R	N	V+	N	N	N	.	.	SFC2311EC	LM311D	0	AMLM311D
TO5-8/1M	G	E+	E-	V-	T	T*S	R	V+	.	.	.	.	.	.	.	.	SFC2311	LM311H	0	AMLM311H
DIL-14/1P	N	T	C	E-	E+	C*	V-	N	F	R	V+	T*	N	N	.	.	.	LM312D	0	AMLM312D
TO5-8/1M	T	E-	E+	V-	F	R	V+	T*	.	.	.	.	.	.	.	.	.	LM312H	0	AMLM312H
DIL-14/1P	N	T	W	E-	E+	W*	V-	N	F	R	V+	T*	N	N	.	.	MLM316AD	LM316AD	0	AMLM316AD
FLP-10/3C	N	W	E-	E+	W*	V-	R	V+	T	T*	.	.	.	.	.	.	.	LM316AF	0	AMLM316AF

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:

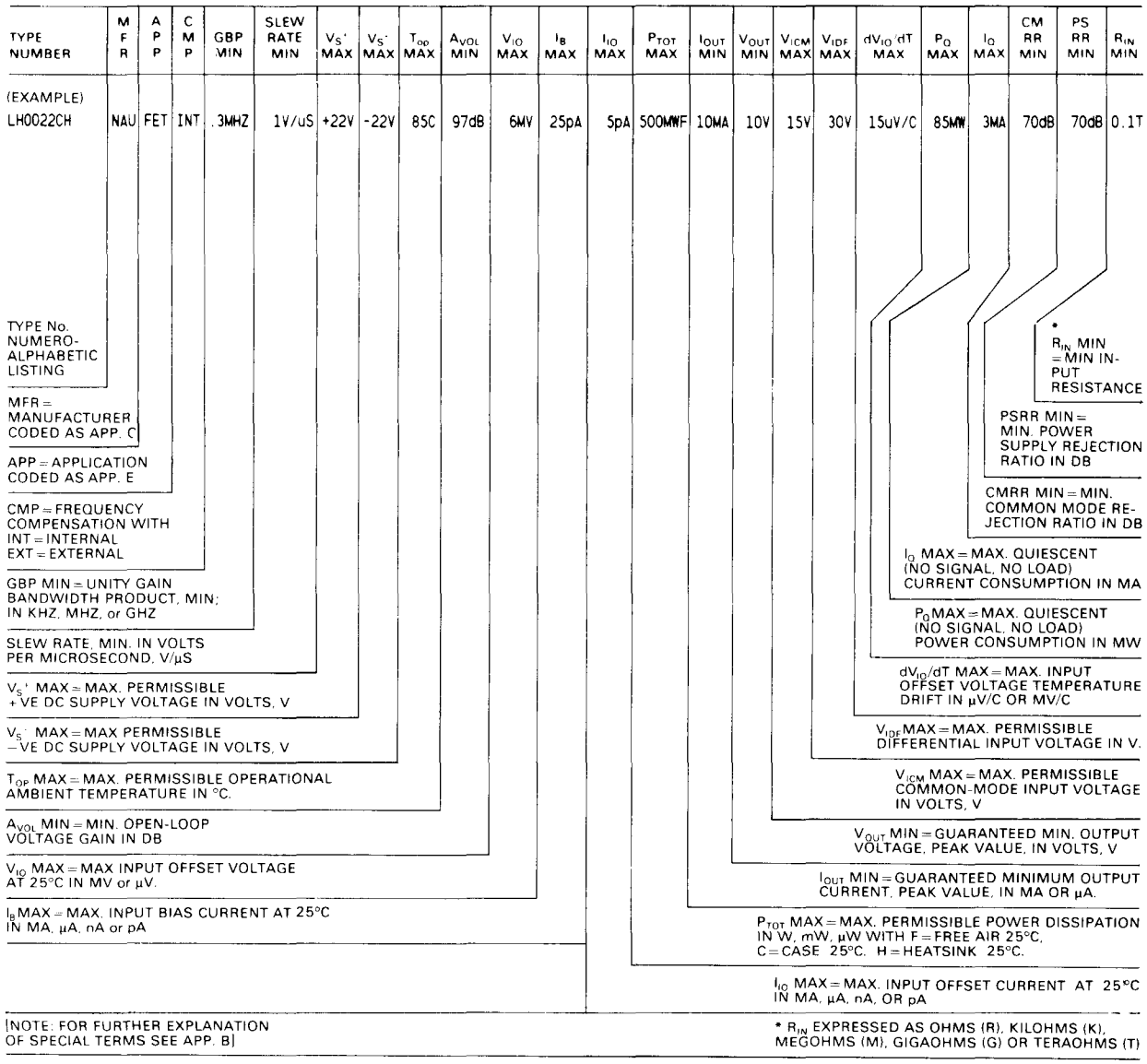
App. B Glossary of *Opamp Terms*
App. C Tabulation *Codes for Manufacturers*
App. D IC Manufacturers' *House Numbers*
App. E Tabulation *Codes for Applications*
App. F *Case Outline and Leadout Diagrams*
App. G Codes for *Leadout Connections*

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
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dV_{IO}/dT = input offset voltage temperature drift
GBP = gain bandwidth product
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MFR = manufacturer (codes at App.C.)
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PSRR = power supply rejection ratio
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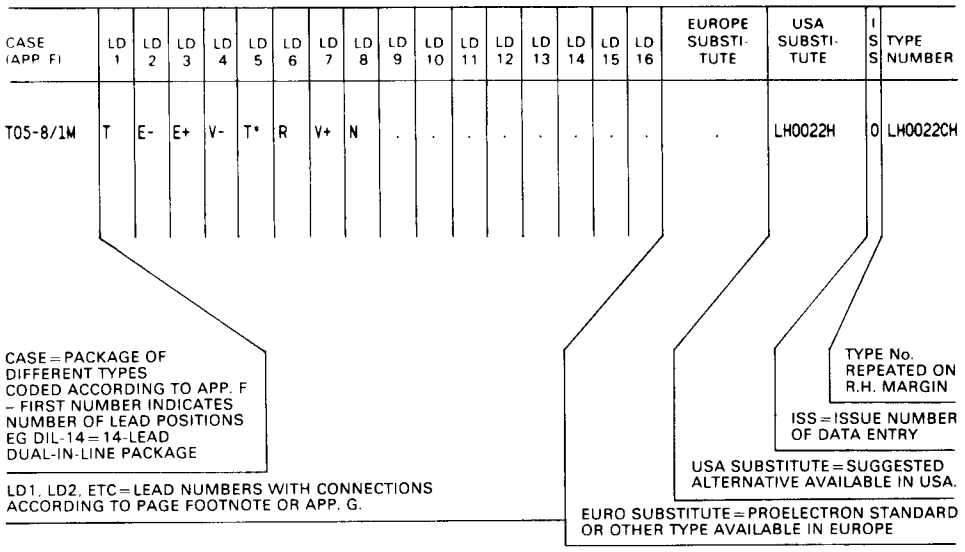
V_{IDF} = differential input voltage rating
V_{IO} = input offset voltage
V_S = dc supply voltage

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

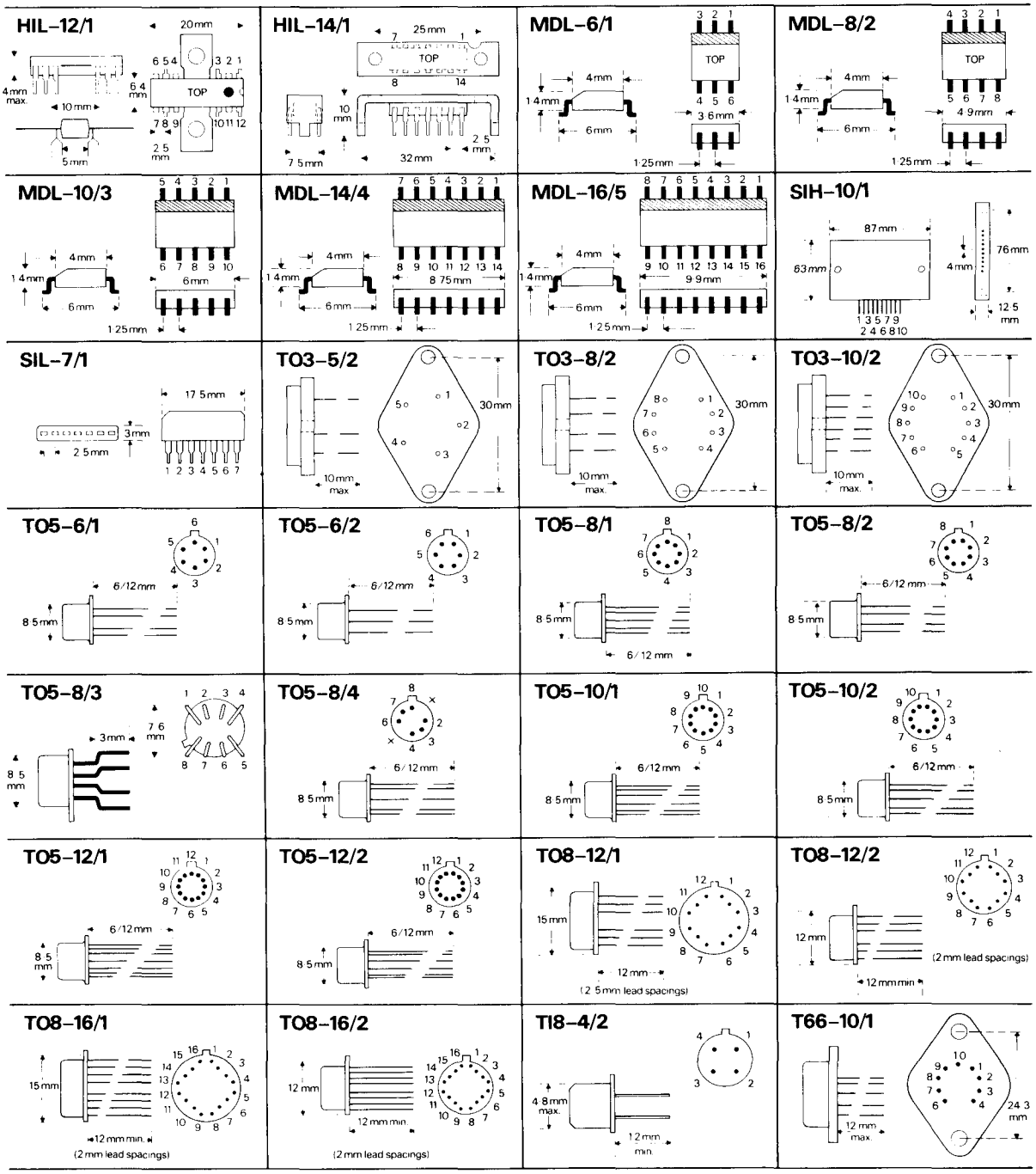
I: Connection Codes in Serial Order

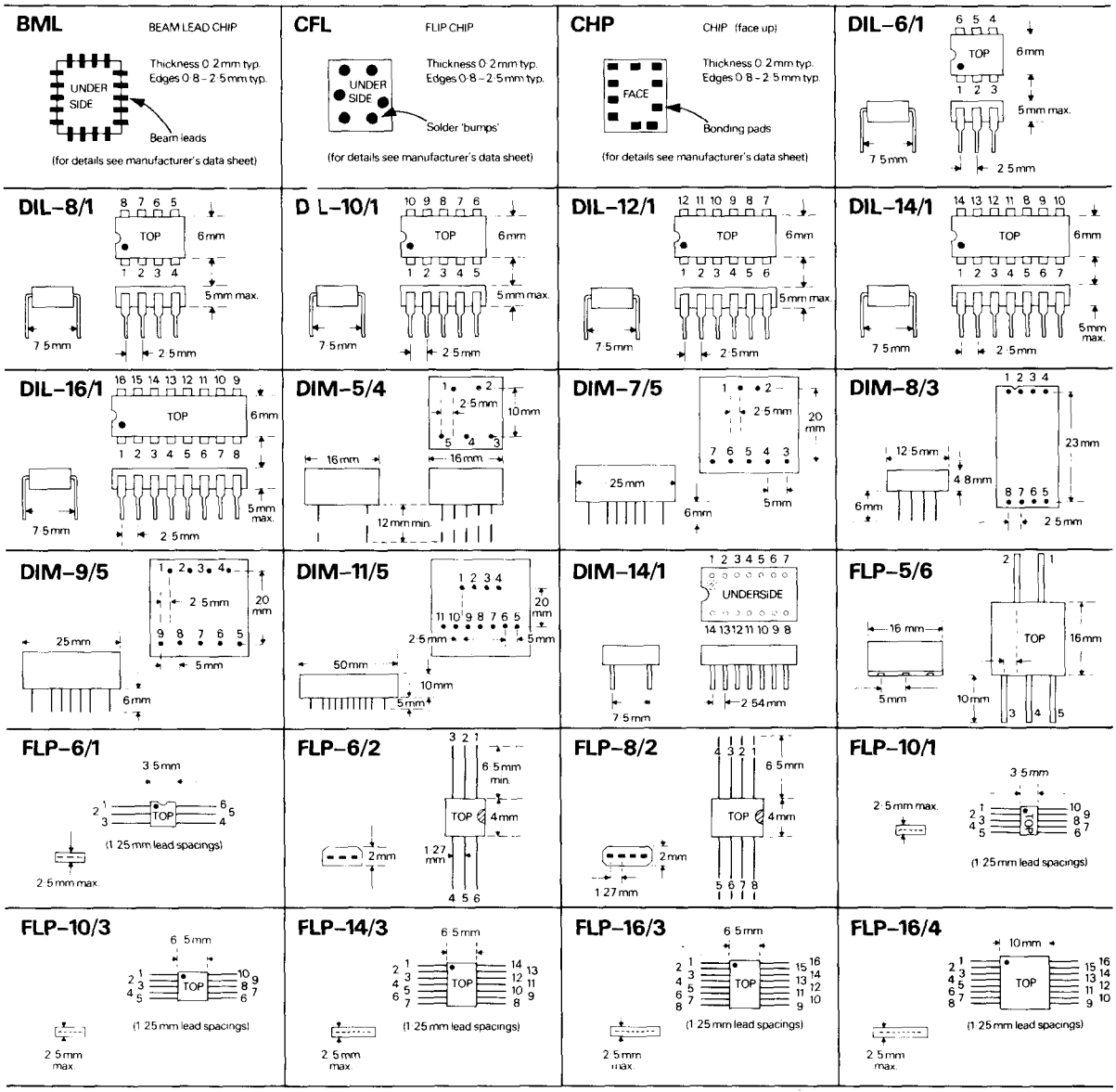
A = Gain adjust, 1
A* = Gain adjust, 2
B = Bias adjust or set
C = Case, package, screen
E+ = Input, non-inverting, low-level
E− = Input, inverting, low-level
F = Input frequency compensation, 1
F* = Input frequency compensation, 2
G = Ground, common, earth, zero volts
J+ = Input, non-inverting, high-level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