| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LM219F | MUG | DCP | INT | . | . | +18V | -18V | 85C | 80dB | 4MV | 500NA | 75NA | 500MWF | . | . | 15V | 5V | . | . | 12MA | . | . | . |
| LM219F | NAU | DCP | INT | . | . | +18V | -18V | 85C | 80dB | 4MV | 500NA | 75NA | 500MWF | . | . | 15V | 5V | . | . | 12MA | . | . | . |
| LM219H | NAU | DCP | INT | . | . | +18V | -18V | 85C | 80dB | 4MV | 500NA | 75NA | 500MWF | . | . | 15V | 5V | . | . | 12MA | . | . | . |
| LM219J | NAU | DCP | INT | . | . | +18V | -18V | 85C | 80dB | 4MV | 500NA | 75NA | 500MWF | . | . | 15V | 5V | . | . | 12MA | . | . | . |
| LM219K | MUG | DCP | INT | . | . | +18V | -18V | 85C | 80dB | 4MV | 500NA | 75NA | 500MWF | . | . | 15V | 5V | . | . | 12MA | . | . | . |
| LM221AD | NAU | PIA | EXT | . | . | +20V | -20V | 85C | 24dB | 0.4MV | 10NA | 0.5NA | 500MWF | . | . | 15V | 15V | 0.2uV/C | . | 2MA | 126dB | 120dB | 4M |
| LM221AF | NAU | PIA | EXT | . | . | +20V | -20V | 85C | 24dB | 0.4MV | 10NA | 0.5NA | 500MWF | . | . | 15V | 15V | 0.2uV/C | . | 2MA | 126dB | 120dB | 4M |
| LM221AH | NAU | PIA | EXT | . | . | +20V | -20V | 85C | 24dB | 0.4MV | 10NA | 0.5NA | 500MWF | . | . | 15V | 15V | 0.2uV/C | . | 2MA | 126dB | 120dB | 4M |
| LM221D | NAU | PIA | EXT | . | . | +20V | -20V | 85C | 24dB | 0.7MV | 10NA | 1NA | 500MWF | . | . | 15V | 15V | 1uV/C | . | 2MA | 120dB | 120dB | 4M |
| LM221F | NAU | PIA | EXT | . | . | +20V | -20V | 85C | 24dB | 0.7MV | 10NA | 1NA | 500MWF | . | . | 15V | 15V | 1uV/C | . | 2MA | 120dB | 120dB | 4M |
| LM221H | NAU | PIA | EXT | . | . | +20V | -20V | 85C | 24dB | 0.7MV | 10NA | 1NA | 500MWF | . | . | 15V | 15V | 1uV/C | . | 2MA | 120dB | 120dB | 4M |
| LM224A | SJU | QGK | INT | . | . | +16V | -16V | 85C | 94dB | 5MV | 150NA | 30NA | 570MWF | . | . | 16V | 16V | 35uV/C | . | 2MA | 70dB | 65dB | . |
| LM224AD | NAU | QGK | INT | . | . | +16V | -16V | 85C | 94dB | 3MV | 80NA | 15NA | 900MWF | . | . | 16V | 16V | 20uV/C | . | 2MA | 70dB | 65dB | . |
| LM224AF | NAU | QGK | INT | . | . | +16V | -16V | 85C | 94dB | 3MV | 80NA | 15NA | 800MWF | . | . | 16V | 16V | 20uV/C | . | 2MA | 70dB | 65dB | . |
| LM224AJ | NAU | QGK | INT | . | . | +16V | -16V | 85C | 94dB | 3MV | 80NA | 15NA | 900MWF | . | . | 16V | 16V | 20uV/C | . | 2MA | 70dB | 65dB | . |
| LM224D | NAU | QGK | INT | . | . | +16V | -16V | 85C | 94dB | 5MV | 150NA | 30NA | 900MWF | . | . | 16V | 16V | 35uV/C | . | 2MA | 70dB | 65dB | . |
| LM224DDD | ING | QGK | INT | . | . | +16V | -16V | 85C | 94dB | 5MV | 150NA | 30NA | 900MWF | . | . | 16V | 16V | 35uV/C | . | 2MA | 70dB | 65dB | . |
| LM224F | MUG | QGK | INT | . | . | +16V | -16V | 85C | 94dB | 5MV | 150NA | 30NA | 900MWF | . | . | 16V | 16V | 35uV/C | . | 2MA | 70dB | 65dB | . |
| LM224F | NAU | QGK | INT | . | . | +16V | -16V | 85C | 94dB | 5MV | 150NA | 30NA | 800MWF | . | . | 16V | 16V | 35uV/C | . | 2MA | 70dB | 65dB | . |
| LM224J | NAU | QGK | INT | . | . | +16V | -16V | 85C | 94dB | 5MV | 150NA | 30NA | 900MWF | . | . | 16V | 16V | 35uV/C | . | 2MA | 70dB | 65dB | . |
| LM224N(14) | MUG | QGK | INT | . | . | +16V | -16V | 85C | 94dB | 5MV | 150NA | 30NA | 570MWF | . | . | 16V | 16V | 35uV/C | . | 2MA | 70dB | 65dB | . |
| LM239A | SJU | QCP | EXT | . | . | +18V | -18V | 85C | 88dB | 5MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239AA | MUG | QCP | EXT | . | . | +18V | -18V | 85C | 94dB | 2MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239AD | NAU | QCP | EXT | . | . | +18V | -18V | 85C | 94dB | 2MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239ADDD | ING | QCP | EXT | . | . | +18V | -18V | 85C | 94dB | 2MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239AF | MUG | QCP | EXT | . | . | +18V | -18V | 85C | 94dB | 2MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239AF | NAU | QCP | EXT | . | . | +18V | -18V | 85C | 94dB | 2MV | 250NA | 50NA | 800MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239AJ | NAU | QCP | EXT | . | . | +18V | -18V | 85C | 94dB | 2MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239AN(14) | MUG | QCP | EXT | . | . | +18V | -18V | 85C | 94dB | 2MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239D | NAU | QCP | EXT | . | . | +18V | -18V | 85C | 88dB | 5MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239DDD | ING | QCP | EXT | . | . | +18V | -18V | 85C | 88dB | 5MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239F | SJU | QCP | EXT | . | . | +18V | -18V | 85C | 88dB | 5MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239F | NAU | QCP | EXT | . | . | +18V | -18V | 85C | 88dB | 5MV | 250NA | 50NA | 800MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239J | NAU | QCP | EXT | . | . | +18V | -18V | 85C | 88dB | 5MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239L | TDG | QCP | EXT | . | . | +18V | -18V | 85C | 88dB | 5MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM239N(14) | MUG | QCP | EXT | . | . | +18V | -18V | 85C | 88dB | 5MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 18V | . | . | 2MA | . | . | . |
| LM248D | NAU | QGK | INT | .3MHZ | 0.2V/uS | +18V | -18V | 85C | 88dB | 6MV | 200NA | 50NA | 900MWF | 5MA | 12V | 18V | 36V | . | . | 1MA | 70dB | 77dB | 800K |
| LM248J | NAU | QGK | INT | .3MHZ | 0.2V/uS | +18V | -18V | 85C | 88dB | 6MV | 200NA | 50NA | 900MWF | 5MA | 12V | 18V | 36V | . | . | 1MA | 70dB | 77dB | 800K |
| LM249D | NAU | QGK | INT | 1MHZ | 0.5V/uS | +18V | -18V | 85C | 88dB | 6MV | 200NA | 50NA | 900MWF | 5MA | 12V | 18V | 36V | . | . | 1MA | 70dB | 77dB | 800K |
| LM249J | NAU | QGK | INT | 1MHZ | 0.5V/uS | +18V | -18V | 85C | 88dB | 6MV | 200NA | 50NA | 900MWF | 5MA | 12V | 18V | 36V | . | . | 1MA | 70dB | 77dB | 800K |
| LM258AH | NAU | DGK | INT | . | . | +16V | -16V | 85C | 94dB | 3MV | 80NA | 15NA | 500MWF | 10MA | . | 16V | 32V | 15uV/C | . | 3MA | 70dB | 65dB | . |
| LM258H | NAU | DGK | INT | . | . | +16V | -16V | 85C | 94dB | 5MV | 150NA | 30NA | 500MWF | 10MA | . | 16V | 32V | 30uV/C | . | 3MA | 70dB | 65dB | . |
| LM258N(8) | MUG | DGK | INT | . | . | +16V | -16V | 85C | 94dB | 5MV | 150NA | 30NA | 500MWF | 10MA | . | 16V | 32V | 30uV/C | . | 3MA | 70dB | 65dB | . |
| LM258T | MUG | DGK | INT | . | . | +16V | -16V | 85C | 94dB | 5MV | 150NA | 30NA | 500MWF | 10MA | . | 16V | 32V | 30uV/C | . | 3MA | 70dB | 65dB | . |
| LM258V | MUG | DGK | INT | . | . | +16V | -16V | 85C | 94dB | 5MV | 150NA | 30NA | 500MWF | 10MA | . | 16V | 32V | 30uV/C | . | 3MA | 70dB | 65dB | . |
| LM260D | NAU | CPR | EXT | . | . | +8V | -8V | 85C | . | 5MV | 20uA | 3uA | . | 6MA | . | 4V | 5V | 40uV/C | . | 32MA | . | . | 5K |
| LM260H | NAU | CPR | EXT | . | . | +8V | -8V | 85C | . | 5MV | 20uA | 3uA | . | 6MA | . | 4V | 5V | 40uV/C | . | 32MA | . | . | 5K |
| LM260J-14 | NAU | CPR | EXT | . | . | +8V | -8V | 85C | . | 5MV | 20uA | 3uA | . | 6MA | . | 4V | 5V | 40uV/C | . | 32MA | . | . | 5K |
| LM261D | NAU | CPR | EXT | . | . | +16V | -16V | 85C | 60dB | 3MV | 20uA | 3uA | 600MWF | 18MA | . | 6V | 5V | . | . | 18MA | . | . | 8K |
| LM261H | NAU | CPR | EXT | . | . | +16V | -16V | 85C | 60dB | 3MV | 20uA | 3uA | 600MWF | 18MA | . | 6V | 5V | . | . | 18MA | . | . | 8K |
| LM261J | NAU | CPR | EXT | . | . | +16V | -16V | 85C | 60dB | 3MV | 20uA | 3uA | 600MWF | 18MA | . | 6V | 5V | . | . | 18MA | . | . | 8K |
| LM293AH | NAU | DCP | EXT | . | . | +18V | -18V | 85C | 94dB | 2MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 36V | . | . | 3MA | . | . | . |
| LM293H | NAU | DCP | EXT | . | . | +18V | -18V | 85C | 94dB | 5MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 36V | . | . | 3MA | . | . | . |
| LM293N(8) | MUG | DCP | EXT | . | . | +18V | -18V | 85C | 94dB | 5MV | 250NA | 50NA | 570MWF | 6MA | . | 18V | 36V | . | . | 3MA | . | . | . |
| LM293T | MUG | DCP | EXT | . | . | +18V | -18V | 85C | 94dB | 5MV | 250NA | 50NA | 900MWF | 6MA | . | 18V | 36V | . | . | 3MA | . | . | . |
| LM293V | MUG | DCP | EXT | . | . | +18V | -18V | 85C | 94dB | 5MV | 250NA | 50NA | 570MWF | 6MA | . | 18V | 36V | . | . | 3MA | . | . | . |
| LM301AA | MUG | GPU | EXT | . | . | +18V | -18V | 70C | 88dB | 7.5MV | 250NA | 50NA | 500MWF | 5MA | 12V | 15V | 30V | 30uV/C | . | 3MA | 70dB | 70dB | 500K |
| LM301AD | MUG | GPU | EXT | . | . | +18V | -18V | 70C | 88dB | 7.5MV | 250NA | 50NA | 500MWF | 5MA | 12V | 15V | 30V | 30uV/C | . | 3MA | 70dB | 70dB | 500K |
| LM301AF | SJU | GPU | EXT | . | . | +18V | -18V | 70C | 88dB | 7.5MV | 250NA | 50NA | 500MWF | 5MA | 12V | 15V | 30V | 30uV/C | . | . | 70dB | 70dB | 500K |
| LM301AH | NAU | GPU | EXT | . | . | +18V | -18V | 70C | 88dB | 7.5MV | 250NA | 50NA | 500MWF | 5MA | 12V | 15V | 30V | 30uV/C | . | 3MA | 70dB | 70dB | 500K |

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

$I_Q$ = 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

$V_{ID}$ = 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.) 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 | I SS | TYPE NUMBER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIL-14/1C | N | N | G1 | E+1 | E-1 | V- | R2 | G2 | E+2 | E-2 | V+ | R1 | N | N | . | . | TDE0119DP | LM219J | 0 | LM219F |
| FLP-10/3G | R1 | G1 | E+1 | E-1 | V- | R2 | G2 | E+2 | E-2 | V+ | . | . | . | . | . | . | . | LM119F | 0 | LM219F |
| TO5-10/1M | R1 | G1 | E+1 | E-1 | V- | R2 | G2 | E+2 | E-2 | V+ | . | . | . | . | . | . | TDE0119CM | LM119H | 0 | LM219H |
| DIL-14/1C | N | N | G1 | E+1 | E-1 | V- | R2 | G2 | E+2 | E-2 | V+ | R1 | N | N | . | . | TDE0119DP | LM219D | 0 | LM219J |
| TO5-10/1M | R1 | G1 | E+1 | E-1 | V- | R2 | G2 | E+2 | E-2 | V+ | . | . | . | . | . | . | TDE0119CM | LM219H | 0 | LM219K |
| DIL-14/1M | N | R | W | E- | E+ | W* | V- | N | T | T* | V+ | R* | N | N | . | . | . | LM121AD | 0 | LM221AD |
| FLP-10/3G | R | W | E- | E+ | W* | V- | T | T* | V+ | R* | . | . | . | . | . | . | . | LM121AF | 0 | LM221AF |
| TO5-8/1M | R | E- | E+ | V- | T | T* | V+ | R* | . | . | . | . | . | . | . | . | . | LM121AH | 0 | LM221AH |
| DIL-14/1M | N | R | W | E- | E+ | W* | V- | N | T | T* | V+ | R* | N | N | . | . | . | LM221AD | 0 | LM221D |
| FLP-10/3G | R | W | E- | E+ | W* | V- | T | T* | V+ | R* | . | . | . | . | . | . | . | LM221AF | 0 | LM221F |
| TO5-8/1M | R | E- | E+ | V- | T | T* | V+ | R* | . | . | . | . | . | . | . | . | . | LM121H | 0 | LM221H |
| 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 | . | . | LM224D | LM224J | 0 | LM224A |
| 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 | . | . | . | LM124AD | 0 | LM224AD |
| FLP-14/3G | R1 | E-1 | E+1 | V+ | E+2 | E-2 | R2 | R3 | E-3 | E+3 | G | E+4 | E-4 | R4 | . | . | . | LM124AF | 0 | LM224AF |
| 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 | . | . | . | LM124AD | 0 | LM224AJ |
| 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 | . | . | . | SG224J | 0 | LM224D |
| 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 | . | . | SG224J | LM224D | 0 | LM224DDD |
| 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 | . | . | LM224J | LM224D | 0 | LM224F |
| FLP-14/3G | R1 | E-1 | E+1 | V+ | E+2 | E-2 | R2 | R3 | E-3 | E+3 | G | E+4 | E-4 | R4 | . | . | . | LM124F | 0 | LM224F |
| 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 | . | . | . | SG224J | 0 | LM224J |
| 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 | . | . | LM224D | LM224J | 0 | LM224N(14) |
| 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 | . | . | MLM239L | LM239D | 0 | LM239A |
| 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 | . | . | MLM239AL | LM239AJ | 0 | LM239AA |
| 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 | . | . | . | MLM239AL | 0 | LM239AD |
| 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 | . | . | MLM239AL | LM239AD | 0 | LM239ADDD |
| 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 | . | . | MLM239AL | LM239AD | 0 | LM239AF |
| FLP-14/3G | R2 | R1 | V+ | E-1 | E+1 | E-2 | E+2 | E+3 | E-3 | E-4 | E+4 | G | R4 | R3 | . | . | . | . | 0 | LM239AF |
| 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 | . | . | . | MLM239AL | 0 | LM239AJ |
| 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 | . | . | MLM239AL | LM239AJ | 0 | LM239AN(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 | . | . | . | MLM239L | 0 | LM239D |
| 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 | LM239DDD |
| 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 | LM239J | 0 | LM239F |
| FLP-14/3G | R2 | R1 | V+ | E-1 | E+1 | E-2 | E+2 | E+3 | E-3 | E-4 | E+4 | G | R4 | R3 | . | . | . | . | 0 | LM239F |
| 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 | 0 | LM239J |
| 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 | LM239J | 0 | LM239L |
| 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 | . | . | MLM239L | LM239D | 0 | LM239N(14) |
| 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 | . | . | . | LM249D | 0 | LM248D |
| 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 | . | . | . | LM249J | 0 | LM248J |
| 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 | . | . | . | LM248D | 0 | LM249D |
| 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 | LM249J |
| TO5-8/1M | R1 | E-1 | E+1 | G | E+2 | E-2 | R2 | V+ | . | . | . | . | . | . | . | . | . | LM158AH | 0 | LM258AH |
| TO5-8/1M | R1 | E-1 | E+1 | G | E+2 | E-2 | R2 | V+ | . | . | . | . | . | . | . | . | . | MLM158G | 0 | LM258H |
| DIL-8/1P | R1 | E-1 | E+1 | G | E+2 | E-2 | R2 | V+ | . | . | . | . | . | . | . | . | . | LM258V | 0 | LM258N(8) |
| TO5-8/1M | R1 | E-1 | E+1 | G | E+2 | E-2 | R2 | V+ | . | . | . | . | . | . | . | . | MLM158G | LM258H | 0 | LM258T |
| DIL-8/1P | R1 | E-1 | E+1 | G | E+2 | E-2 | R2 | V+ | . | . | . | . | . | . | . | . | . | LM258N8 | 0 | LM258V |
| DIL-14/1M | N | N | N | E- | E+ | V- | N | N | G | R | R* | V+ | N | N | . | . | . | UA760DM | 0 | LM260D |
| TO5-8/1M | N | E- | E+ | V- | G | R | R* | V+ | . | . | . | . | . | . | . | . | . | LM160H | 0 | LM260H |
| DIL-14/1C | N | N | N | E- | E+ | V- | N | N | G | R | R* | V+ | N | N | . | . | . | LM160D | 0 | LM260J-14 |
| DIL-14/1M | V+ | N | E+ | E- | N | V- | N | S2 | R | G | R* | N | S1 | ++ | . | . | . | LM161D | 0 | LM261D |
| TO5-10/1M | E+ | E- | V- | S2 | R | G | R* | S1 | ++ | V+ | . | . | . | . | . | . | . | LM161H | 0 | LM261H |
| DIL-14/1C | V+ | N | E+ | E- | N | V- | N | S2 | R | G | R* | N | S1 | ++ | . | . | . | LM161J | 0 | LM261J |
| TO5-8/1M | R1 | E-1 | E+1 | G | E+2 | E-2 | R2 | V+ | . | . | . | . | . | . | . | . | . | LM193AH | 0 | LM293AH |
| TO5-8/1M | R1 | E-1 | E+1 | G | E+2 | E-2 | R2 | V+ | . | . | . | . | . | . | . | . | . | LM193H | 0 | LM293H |
| DIL-8/1P | R1 | E-1 | E+1 | G | E+2 | E-2 | R2 | V+ | . | . | . | . | . | . | . | . | . | LM2903N | 0 | LM293N(8) |
| TO5-8/1M | R1 | E-1 | E+1 | G | E+2 | E-2 | R2 | V+ | . | . | . | . | . | . | . | . | . | LM293H | 0 | LM293T |
| DIL-8/1P | R1 | E-1 | E+1 | G | E+2 | E-2 | R2 | V+ | . | . | . | . | . | . | . | . | . | LM2903N | 0 | LM293V |
| DIL-14/1P | N | N | FT | E- | E+ | V- | N | N | T* | R | V+ | F* | N | N | . | . | UA301AD | LM301AJ14 | 0 | LM301AA |
| MDL-8/2P | FT | E- | E+ | V- | T* | R | V+ | F* | . | . | . | . | . | . | . | . | . | TDA0301D | 0 | LM301AD |
| DIL-14/1C | N | N | FT | E- | E+ | V- | N | N | T* | R | V+ | F* | N | N | . | . | UA301AD | LM301AJ14 | 0 | LM301AF |
| TO5-8/1M | FT | E- | E+ | V-M | T* | R | V+ | F* | . | . | . | . | . | . | . | . | SFC2301AH | UA301AH | 0 | LM301AH |

# 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:

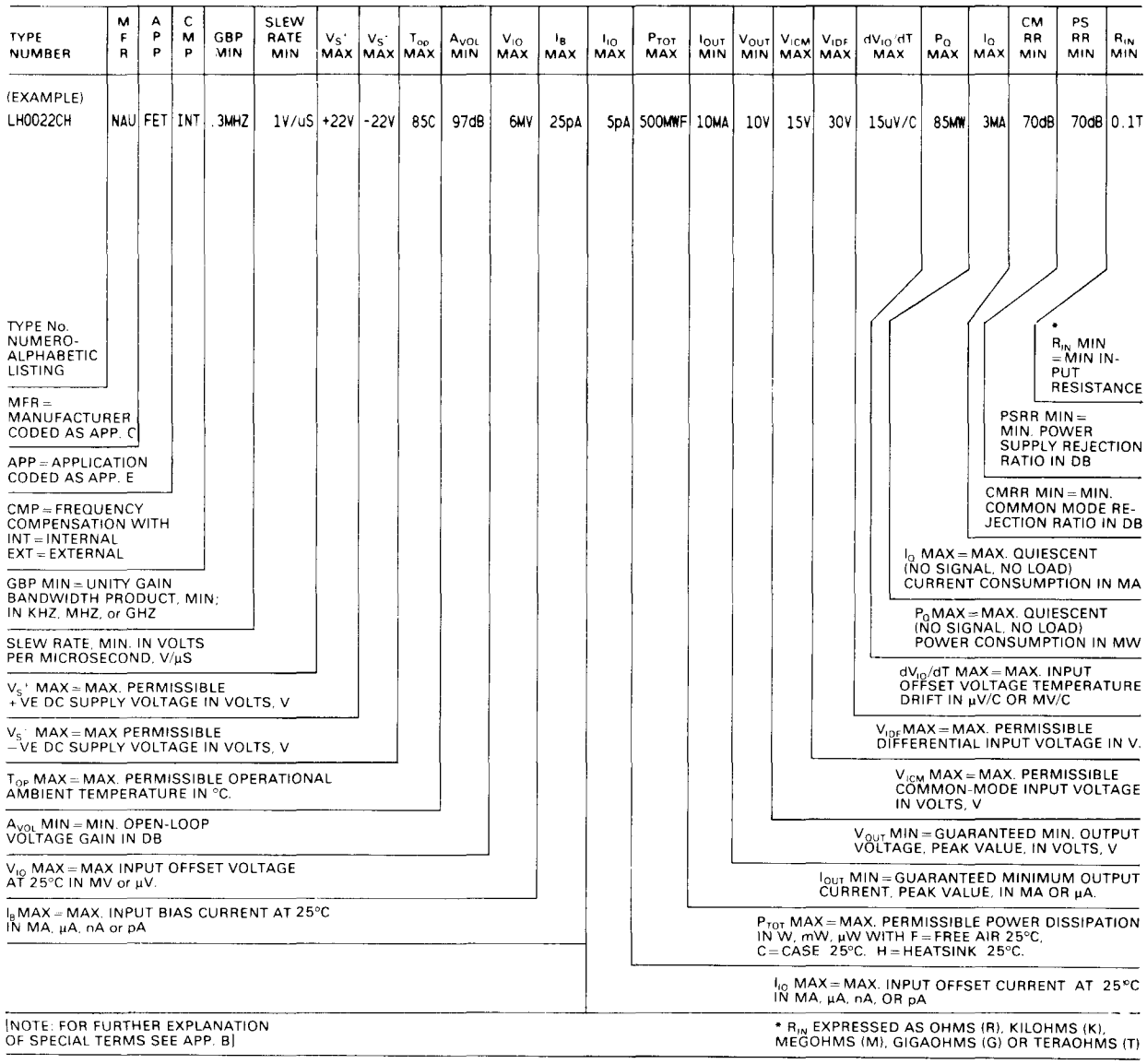
App. B Glossary of *Opamp Terms*
App. C Tabulation *Codes for Manufacturers*
App. D IC Manufacturers' *House Numbers*
App. E Tabulation *Codes for Applications*
App. F *Case Outline and Leadout Diagrams*
App. G Codes for *Leadout Connections*

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.

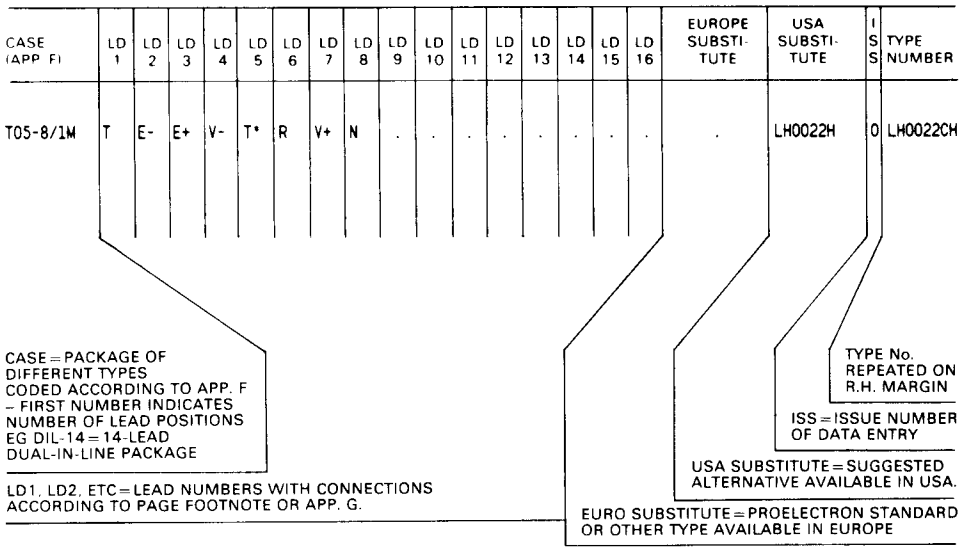
Also for ready references the more important abbreviations used in the column headings are listed below:

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

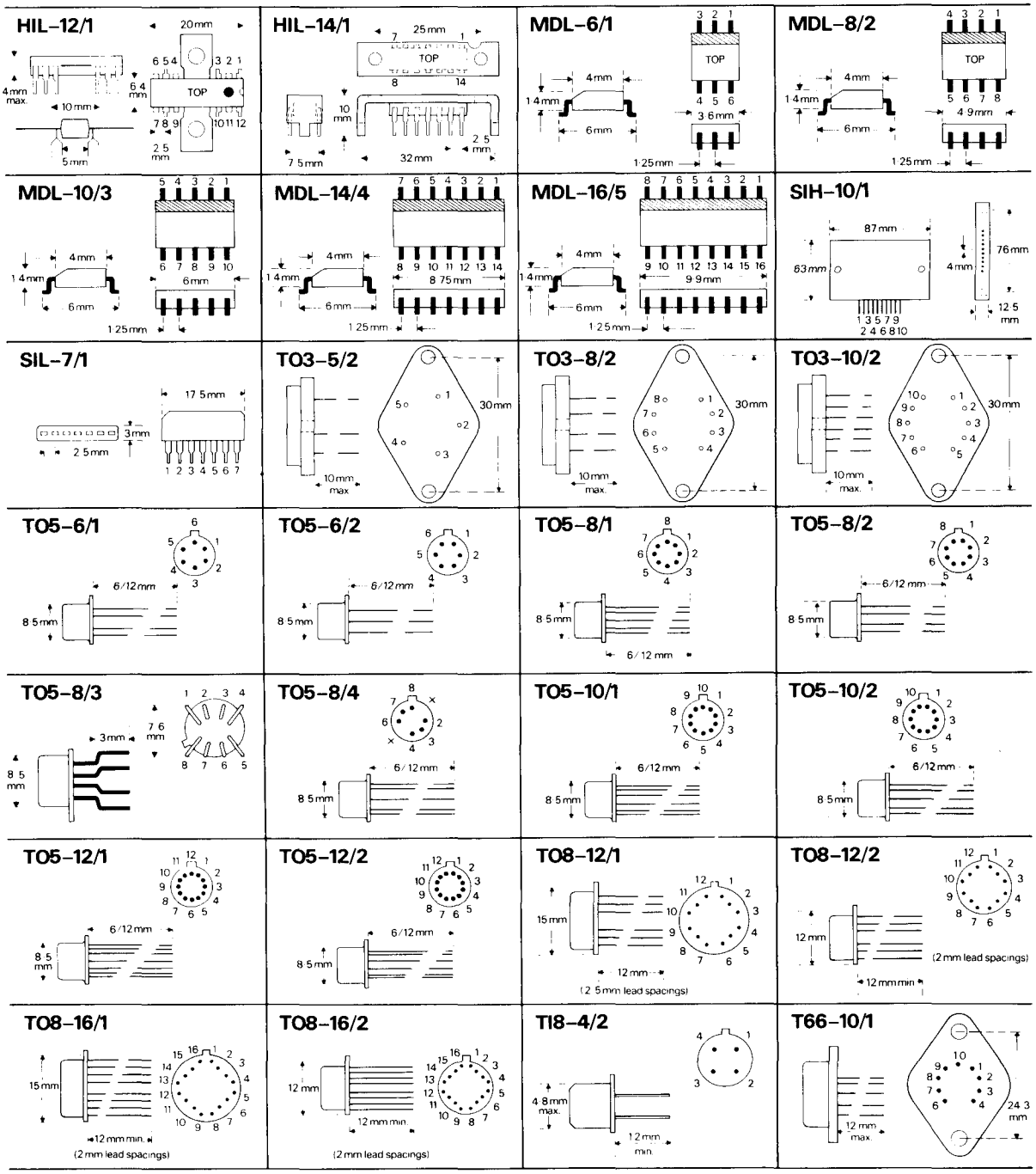
*I: Connection Codes in Serial Order*

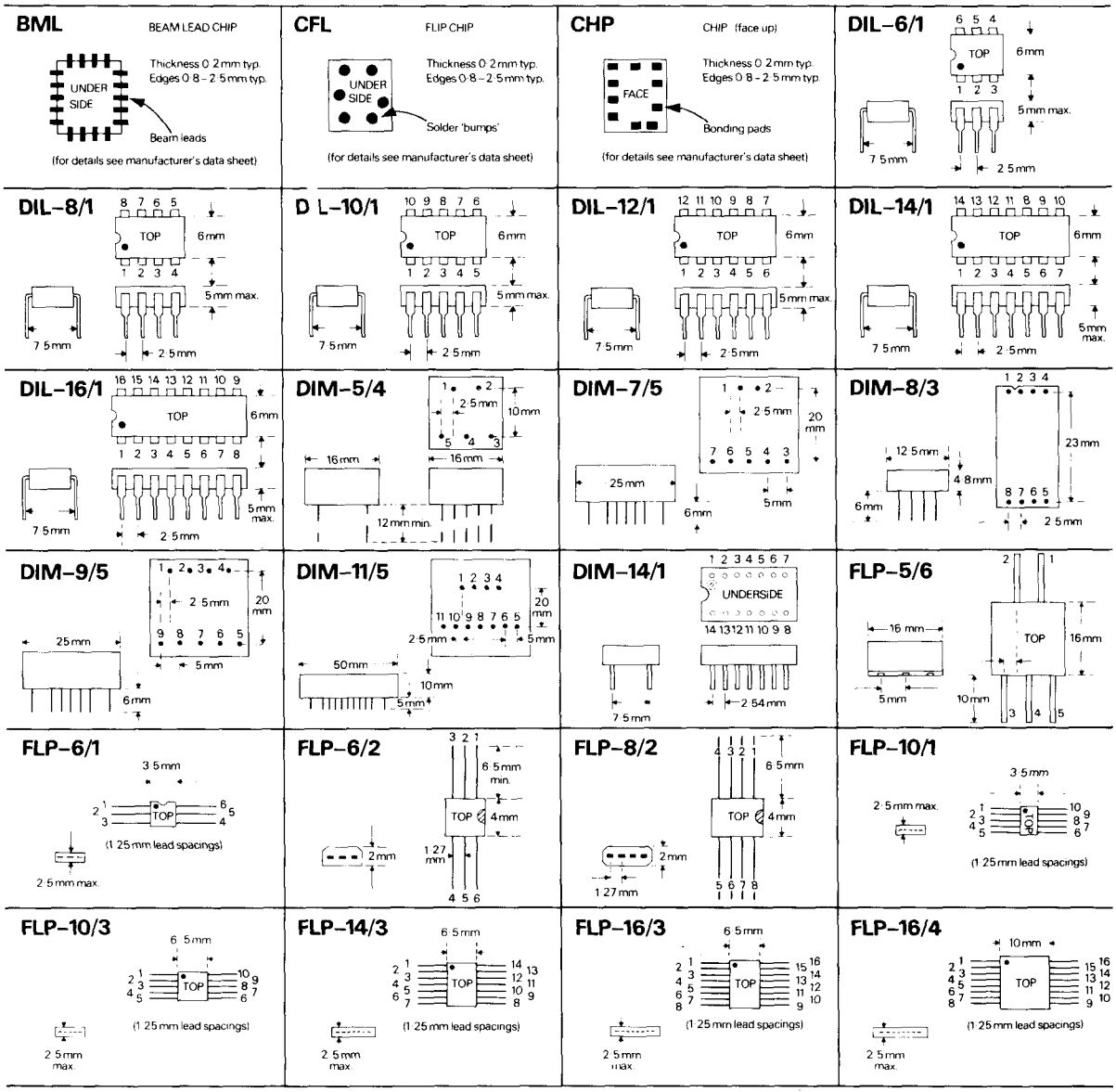
A = Gain adjust, 1
A* = Gain adjust, 2
B = Bias adjust or set
C = Case, package, screen
E+ = Input, non-inverting, low-level
E− = Input, inverting, low-level
F = Input frequency compensation, 1
F* = Input frequency compensation, 2
G = Ground, common, earth, zero volts
J+ = Input, non-inverting, high-level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