

|               |                       |
|---------------|-----------------------|
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| Status        | Product Specification |
| FAST Products |                       |

# FAST 74F112

## Flip-Flop

### Dual J-K Negative Edge-triggered Flip-Flop

#### FEATURE

- Industrial temperature range available (-40°C to +85°C)

#### DESCRIPTION

The 74F112, Dual Negative Edge-Triggered JK-Type Flip-Flop, features individual J, K, Clock ( $\overline{CP}_n$ ), Set ( $\overline{S}_D$ ) and Reset ( $\overline{R}_D$ ) inputs, true ( $Q_n$ ) and complementary ( $\overline{Q}_n$ ) outputs.

The  $\overline{S}_D$  and  $\overline{R}_D$  inputs, when Low, set or reset the outputs as shown in the Function Table regardless of the level at the other inputs.

A High level on the clock ( $\overline{CP}_n$ ) input enables the J and K inputs and data will be accepted. The logic levels at the J and K inputs may be allowed to change while the  $\overline{CP}_n$  is High and flip-flop will perform according to the Function Table as long as minimum setup and hold times are observed. Output changes are initiated by the High-to-Low transition of the  $\overline{CP}_n$ .

| TYPE    | TYPICAL $f_{MAX}$ | TYPICAL SUPPLY CURRENT (TOTAL) |
|---------|-------------------|--------------------------------|
| N74F112 | 100MHz            | 15mA                           |

#### ORDERING INFORMATION

| PACKAGES           | COMMERCIAL RANGE<br>$V_{CC} = 5V \pm 10\%$<br>$T_A = 0^\circ C$ to $+70^\circ C$ | INDUSTRIAL RANGE<br>$V_{CC} = 5V \pm 10\%$<br>$T_A = -40^\circ C$ to $+85^\circ C$ |
|--------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 16-Pin Plastic DIP | N74F112N                                                                         | I74F112N                                                                           |
| 16-Pin Plastic SO  | N74F112D                                                                         | I74F112D                                                                           |

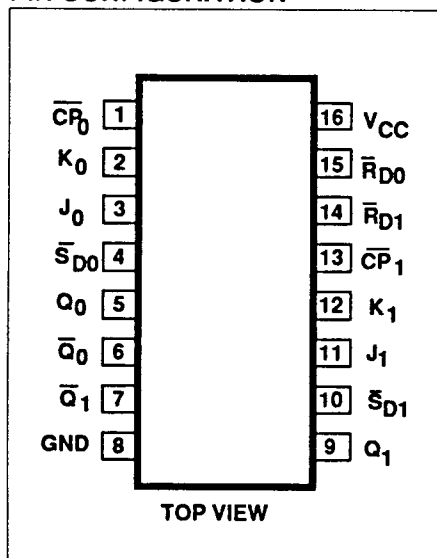
#### INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

| PINS                                       | DESCRIPTION                             | 74F(U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW |
|--------------------------------------------|-----------------------------------------|--------------------|---------------------|
| $J_0, J_1$                                 | J inputs                                | 1.0/1.0            | 20 $\mu$ A/0.6mA    |
| $K_0, K_1$                                 | K inputs                                | 1.0/1.0            | 20 $\mu$ A/0.6mA    |
| $\overline{S}_{D0}, \overline{S}_{D1}$     | Set inputs (active Low)                 | 1.0/5.0            | 20 $\mu$ A/3.0mA    |
| $\overline{R}_{D0}, \overline{R}_{D1}$     | Reset inputs (active Low)               | 1.0/5.0            | 20 $\mu$ A/3.0mA    |
| $\overline{CP}_0, \overline{CP}_1$         | Clock Pulse input (active falling edge) | 1.0/4.0            | 20 $\mu$ A/2.4mA    |
| $Q_0, \overline{Q}_0; Q_1, \overline{Q}_1$ | Data outputs                            | 50/33              | 1.0mA/20mA          |

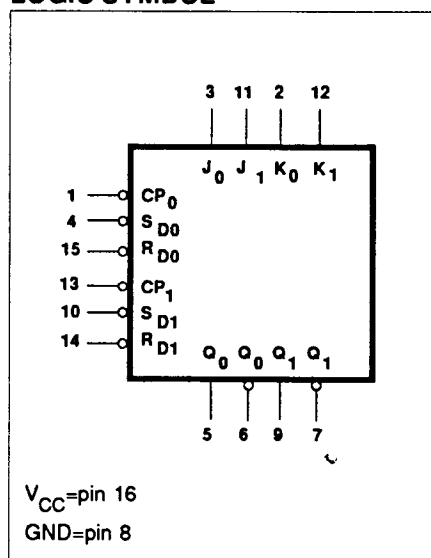
#### NOTE:

One (1.0) FAST Unit Load is defined as: 20 $\mu$ A in the High state and 0.6mA in the Low state.

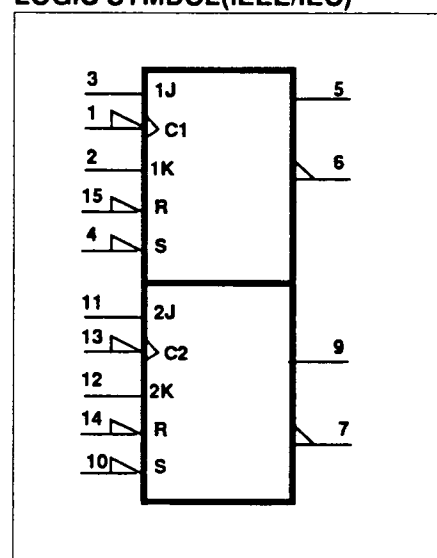
#### PIN CONFIGURATION



#### LOGIC SYMBOL



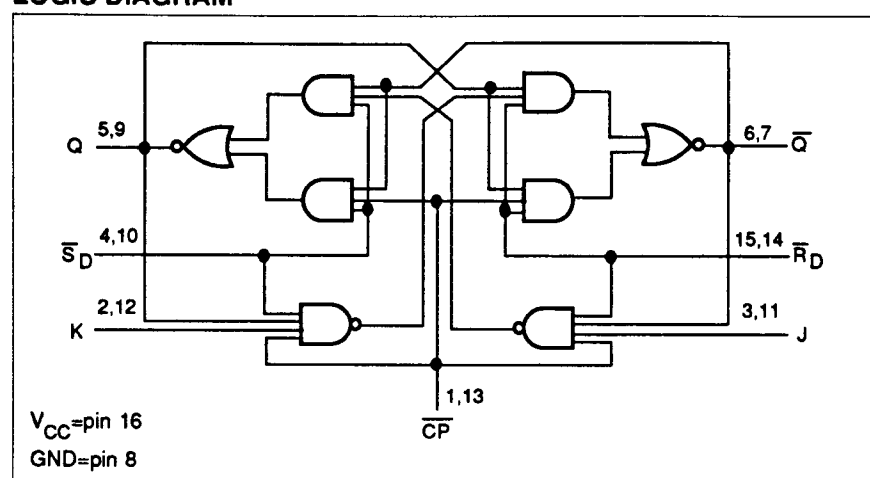
#### LOGIC SYMBOL(IEEE/IEC)



## Flip-Flop

FAST 74F112

## LOGIC DIAGRAM



## FUNCTION TABLE

| INPUTS      |             |            |   |   | OUTPUTS   |           | OPERATING MODE     |
|-------------|-------------|------------|---|---|-----------|-----------|--------------------|
| $\bar{S}_D$ | $\bar{R}_D$ | $\bar{CP}$ | J | K | Q         | $\bar{Q}$ |                    |
| L           | H           | X          | X | X | H         | L         | Asynchronous Set   |
| H           | L           | X          | X | X | L         | H         | Asynchronous Reset |
| L           | L           | X          | X | X | H*        | H*        | Undetermined *     |
| H           | H           | ↓          | h | h | $\bar{q}$ | q         | Toggle             |
| H           | H           | ↓          | l | h | L         | H         | Load "0" (Reset)   |
| H           | H           | ↓          | h | l | H         | L         | Load "1" (Set)     |
| H           | H           | ↓          | l | l | q         | $\bar{q}$ | Hold "no change"   |
| H           | H           | H          | X | X | Q         | $\bar{Q}$ | Hold "no change"   |

H = High voltage level

h = High voltage level one setup time prior to High-to-Low clock transition

L = Low voltage level

l = Low voltage level one setup time prior to High-to-Low clock transition

q = Lower case letters indicate the state of the referenced output prior to the High-to-Low clock transition

X = Don't care

↓ = High-to-Low clock transition

\* = Both outputs will be High while both  $\bar{S}_D$  and  $\bar{R}_D$  are Low, but the output states are unpredictable if  $\bar{S}_D$  and  $\bar{R}_D$  go High simultaneously.

**ABSOLUTE MAXIMUM RATINGS** (Operation beyond the limits set forth in this table may impair the useful life of the device. Unless otherwise noted these limits are over the operating free-air temperature range.)

| SYMBOL    | PARAMETER                                      |                  | RATING           | UNIT |
|-----------|------------------------------------------------|------------------|------------------|------|
| $V_{CC}$  | Supply voltage                                 |                  | -0.5 to +7.0     | V    |
| $V_{IN}$  | Input voltage                                  |                  | -0.5 to +7.0     | V    |
| $I_{IN}$  | Input current                                  |                  | -30 to +5        | mA   |
| $V_{OUT}$ | Voltage applied to output in High output state |                  | -0.5 to $V_{CC}$ | V    |
| $I_{OUT}$ | Current applied to output in Low output state  |                  | 40               | mA   |
| $T_A$     | Operating free-air temperature range           | Commercial range | 0 to +70         | °C   |
|           |                                                | Industrial range | -40 to +85       | °C   |
| $T_{STG}$ | Storage temperature                            |                  | -65 to +150      | °C   |

## Flip-Flop

FAST 74F112

## RECOMMENDED OPERATING CONDITIONS

| SYMBOL   | PARAMETER                            | LIMITS           |     |     | UNIT |
|----------|--------------------------------------|------------------|-----|-----|------|
|          |                                      | Min              | Nom | Max |      |
| $V_{CC}$ | Supply voltage                       | 4.5              | 5.0 | 5.5 | V    |
| $V_H$    | High-level input voltage             | 2.0              |     |     | V    |
| $V_L$    | Low-level input voltage              |                  |     | 0.8 | V    |
| $I_{IK}$ | Input clamp current                  |                  |     | -18 | mA   |
| $I_{OH}$ | High-level output current            |                  |     | -1  | mA   |
| $I_{OL}$ | Low-level output current             |                  |     | 20  | mA   |
| $T_A$    | Operating free-air temperature range | Commercial range | 0   | 70  | °C   |
|          |                                      | Industrial range | -40 | 85  | °C   |

## DC ELECTRICAL CHARACTERISTICS (Over recommended operating free-air temperature range unless otherwise noted.)

| SYMBOL          | PARAMETER                                 |  | TEST CONDITIONS <sup>1</sup>                            |                                              | LIMITS |                  |      | UNIT |
|-----------------|-------------------------------------------|--|---------------------------------------------------------|----------------------------------------------|--------|------------------|------|------|
|                 |                                           |  |                                                         |                                              | Min    | Typ <sup>2</sup> | Max  |      |
| V <sub>OH</sub> | High-level output voltage                 |  | V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX            | ±10%V <sub>CC</sub>                          | 2.5    |                  |      | V    |
|                 |                                           |  | V <sub>IH</sub> = MIN, I <sub>OH</sub> = MAX            | ±5%V <sub>CC</sub>                           | 2.7    | 3.4              |      | V    |
| V <sub>OL</sub> | Low-level output voltage                  |  | V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX            | ±10%V <sub>CC</sub>                          |        | 0.35             | 0.50 | V    |
|                 |                                           |  | V <sub>IH</sub> = MIN, I <sub>OL</sub> = MAX            | ±5%V <sub>CC</sub>                           |        | 0.35             | 0.50 | V    |
| V <sub>IK</sub> | Input clamp voltage                       |  | V <sub>CC</sub> = MIN, I <sub>I</sub> = I <sub>IK</sub> |                                              |        | -0.73            | -1.2 | V    |
| I <sub>I</sub>  | Input current at maximum input voltage    |  | V <sub>CC</sub> = MAX, V <sub>I</sub> = 7.0V            |                                              |        |                  | 100  | μA   |
| I <sub>IH</sub> | High-level input current                  |  | V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7V            |                                              |        |                  | 20   | μA   |
| I <sub>IL</sub> | Low-level input current                   |  | J <sub>n</sub> , K <sub>n</sub>                         | V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5V |        |                  | -0.6 | mA   |
|                 |                                           |  | $\overline{CP}_n$                                       |                                              |        |                  | -2.4 | mA   |
|                 |                                           |  | $\overline{SD}_n$ , $\overline{RD}_n$                   |                                              |        |                  | -3.0 | mA   |
| I <sub>OS</sub> | Short-circuit output current <sup>3</sup> |  | V <sub>CC</sub> = MAX                                   |                                              | -60    |                  | -150 | mA   |
| I <sub>CC</sub> | Supply current (total) <sup>4</sup>       |  | V <sub>CC</sub> = MAX                                   |                                              |        | 15               | 21   | mA   |

## NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at  $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ .
- Not more than one output should be shorted at a time. For testing  $I_{OS}$ , the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter test,  $I_{OS}$  tests should be performed last.
- Measure  $I_{CC}$  with the clock input grounded and all outputs open, with the Q and  $\overline{Q}$  outputs High in turn.

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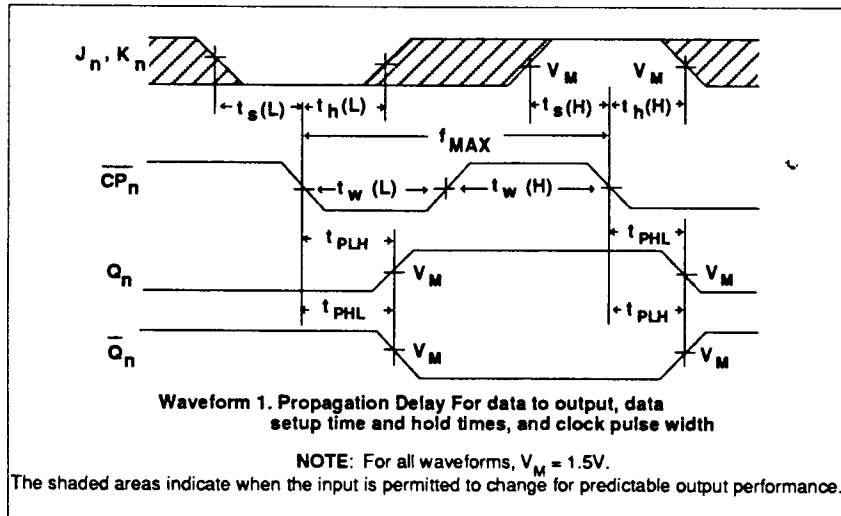
## AC ELECTRICAL CHARACTERISTICS

| SYMBOL                               | PARAMETER                                                                             | TEST CONDITION | LIMITS                                                           |     |     |                                                                           |     |                                                                           |     |     | UNIT |
|--------------------------------------|---------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------|-----|-----|---------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|-----|-----|------|
|                                      |                                                                                       |                | $T_A = +25^{\circ}\text{C}$                                      |     |     | $T_A = 0^{\circ}\text{C to } +70^{\circ}\text{C}$                         |     | $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$                       |     |     |      |
|                                      |                                                                                       |                | $V_{CC} = 5\text{V}$<br>$C_L = 50\text{pF}$<br>$R_L = 500\Omega$ |     |     | $V_{CC} = 5\text{V} \pm 10\%$<br>$C_L = 50\text{pF}$<br>$R_L = 500\Omega$ |     | $V_{CC} = 5\text{V} \pm 10\%$<br>$C_L = 50\text{pF}$<br>$R_L = 500\Omega$ |     |     |      |
|                                      |                                                                                       |                | Min                                                              | Typ | Max | Min                                                                       | Max | Min                                                                       | Max |     |      |
| $f_{\text{MAX}}$                     | Maximum clock frequency                                                               | Waveform 1     | 85                                                               | 100 |     | 80                                                                        |     | 80                                                                        |     | MHz |      |
| $t_{\text{PLH}}$<br>$t_{\text{PHL}}$ | Propagation delay<br>$\overline{\text{CP}}$ to $Q_n$ or $\overline{Q}_n$              | Waveform 1     | 2.0                                                              | 5.0 | 6.5 | 2.0                                                                       | 7.5 | 2.0                                                                       | 7.5 | ns  |      |
| $t_{\text{PLH}}$<br>$t_{\text{PHL}}$ | Propagation delay<br>$\overline{S}_{Dn}, \overline{R}_D$ to $Q_n$ or $\overline{Q}_n$ | Waveform 2,3   | 2.0                                                              | 4.5 | 6.5 | 2.0                                                                       | 7.5 | 1.5                                                                       | 7.5 | ns  |      |

## AC SETUP REQUIREMENTS

| SYMBOL                             | PARAMETER                                                                      | TEST CONDITION | LIMITS                                                           |     |     |                                                                           |     |                                                                           |     |    | UNIT |
|------------------------------------|--------------------------------------------------------------------------------|----------------|------------------------------------------------------------------|-----|-----|---------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|-----|----|------|
|                                    |                                                                                |                | $T_A = +25^{\circ}\text{C}$                                      |     |     | $T_A = 0^{\circ}\text{C to } +70^{\circ}\text{C}$                         |     | $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$                       |     |    |      |
|                                    |                                                                                |                | $V_{CC} = 5\text{V}$<br>$C_L = 50\text{pF}$<br>$R_L = 500\Omega$ |     |     | $V_{CC} = 5\text{V} \pm 10\%$<br>$C_L = 50\text{pF}$<br>$R_L = 500\Omega$ |     | $V_{CC} = 5\text{V} \pm 10\%$<br>$C_L = 50\text{pF}$<br>$R_L = 500\Omega$ |     |    |      |
|                                    |                                                                                |                | Min                                                              | Typ | Max | Min                                                                       | Max | Min                                                                       | Max |    |      |
| $t_s(\text{H})$<br>$t_s(\text{L})$ | Setup time, High or Low<br>$J_n, K_n$ to $\overline{\text{CP}}$                | Waveform 1     | 4.0                                                              |     |     | 5.0                                                                       |     | 5.0                                                                       |     | ns |      |
| $t_h(\text{H})$<br>$t_h(\text{L})$ | Hold time, High or Low<br>$J_n, K_n$ to $\overline{\text{CP}}$                 | Waveform 1     | 0.0                                                              |     |     | 0.0                                                                       |     | 0.0                                                                       |     | ns |      |
| $t_w(\text{H})$<br>$t_w(\text{L})$ | $\overline{\text{CP}}$ Pulse width<br>High or Low                              | Waveform 1     | 4.5                                                              |     |     | 5.0                                                                       |     | 5.0                                                                       |     | ns |      |
| $t_w(\text{L})$                    | $\overline{S}_{Dn}, \overline{R}_D$ Pulse width<br>Low                         | Waveform 2,3   | 4.5                                                              |     |     | 5.0                                                                       |     | 5.0                                                                       |     | ns |      |
| $t_{\text{REC}}$                   | Recovery time<br>$\overline{S}_{Dn}, \overline{R}_D$ to $\overline{\text{CP}}$ | Waveform 2,3   | 4.5                                                              |     |     | 5.0                                                                       |     | 5.0                                                                       |     | ns |      |

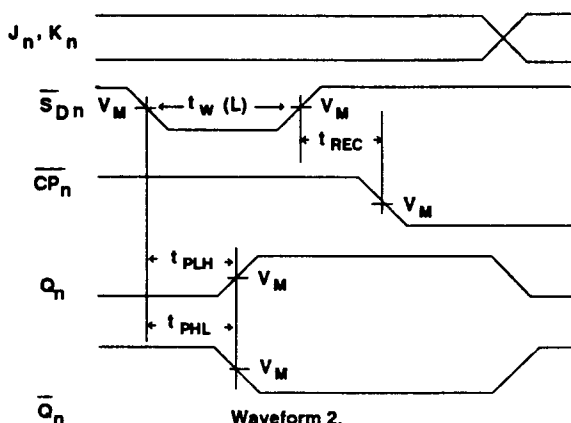
## AC WAVEFORMS



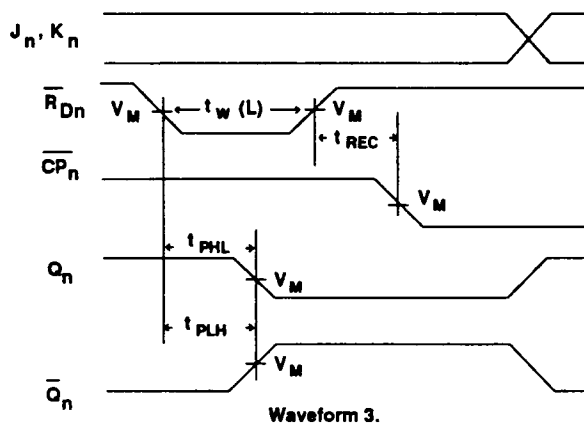
## Flip-Flop

## FAST 74F112

## AC WAVEFORMS



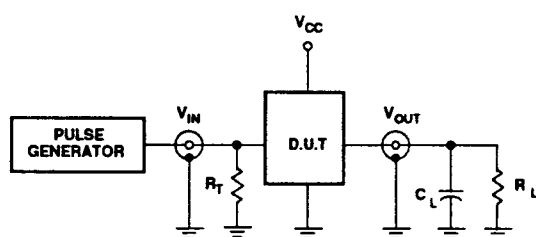
**Waveform 2.**  
Propagation Delay for Set to Output, Set  
Pulse Width, and Recovery Time for Set to Clock



**Waveform 3.**  
Propagation Delay for Reset to Output, Reset  
Pulse Width, and Recovery Time for Reset to Clock

NOTE: For all waveforms,  $V_M = 1.5V$ .

## TEST CIRCUIT AND WAVEFORMS



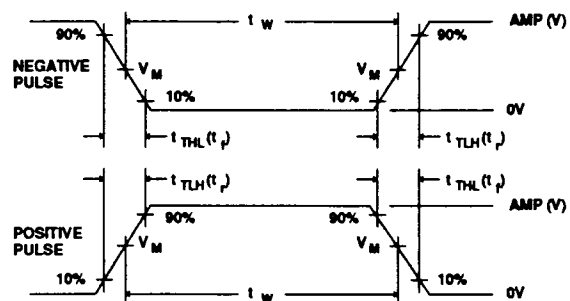
**Test Circuit For Totem-Pole Outputs**

## DEFINITIONS

$R_L$  = Load resistor; see AC CHARACTERISTICS for value.

$C_L$  = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

$R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.



$V_M = 1.5V$

Input Pulse Definition

| FAMILY | INPUT PULSE REQUIREMENTS |           |       |           |           |
|--------|--------------------------|-----------|-------|-----------|-----------|
|        | Amplitude                | Rep. Rate | $t_W$ | $t_{TLH}$ | $t_{THL}$ |
| 74F    | 3.0V                     | 1MHz      | 500ns | 2.5ns     | 2.5ns     |

## VI. COMMERCIAL PRODUCT SPECIAL PROCESSING T-90-20

### SUPR II LEVEL B PRICING ADDERS

#### SUPR II LEVEL B

Signetics Upgraded Product Reliability (SUPR) program is designed to provide customers whose systems require an infant mortality level less than that of our non-burned-in products (which is typically below 1000 PPM).

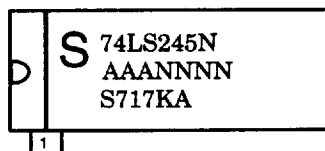
#### DEVICE AVAILABILITY

Products available for Level B processing are identified in the Price Book with a "B" suffix to the basic part number.

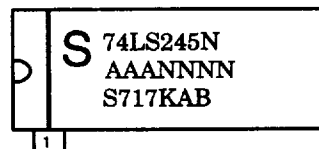
| PRODUCT FAMILY | SUGGESTED RESALE ADDERS     |         |           |
|----------------|-----------------------------|---------|-----------|
|                | 1-99                        | 100-999 | OVER 1000 |
| LIN            | .14                         | .14     | .11       |
| LOG (TTL)      |                             |         |           |
| (SSl)          | .12                         | .10     | .08       |
| (MSl)          | .16                         | .14     | .11       |
| (OCT)          | .16                         | .14     | .11       |
| (CTM)          | .16                         | .14     | .11       |
| LOG (ECL)      |                             |         |           |
| (SSl)          | .25                         | .23     | .20       |
| (MSl)          | .25                         | .23     | .20       |
| LOG (LSI)      | Consult Factory for Pricing |         |           |
| (RAM)          |                             |         |           |
| MIC (8X)       |                             |         |           |
| PLD            | Consult Factory for Pricing |         |           |
| MCG            | Consult Factory for Pricing |         |           |
| DAT            | Not Available               |         |           |
| MIC            |                             |         |           |

### MARKING FORMAT EXAMPLES

Standard (no Burn-In) Products (Dual-in-line)



SUPR II (Burned-In) Products (Dual-in-line)



**NOTE:** The "B" in the 7<sup>th</sup> position on the 3<sup>rd</sup> line, when present, is the SUPR II Burn-In indicator.

### TAPE AND REEL PACKAGING

#### SPECIFICATIONS

Tape and Reel specifications conform to Electronic Industries Association (EIA) Proposed Specification #EIA-481-A using 13 inch reels. Current incremental quantities reflect the quantities per reel. As more customers are able to handle a larger quantity per reel, this quantity will be increased.

#### DEVICE AVAILABILITY

Products available in tape and reel packaging are identified in the Price Book with a "T" suffix to the basic part number and are only offered as a product for sale by the reel. Return of product is limited to full reels with unbroken quality seals.

#### TAPE AND REEL PRICING ADDERS

| PRODUCT FAMILY | SUGGESTED RESALE ADDER                                                             |
|----------------|------------------------------------------------------------------------------------|
| MCG            | .07                                                                                |
| LIN            | .07                                                                                |
| LOG            | .07                                                                                |
| DAT            | PACKAGE A28 = .20<br>A44 = .25<br>A52 = .30<br>A68 = .40<br>A84 = .45<br>D24 = .17 |
| MIC            |                                                                                    |
|                |                                                                                    |
|                |                                                                                    |
|                |                                                                                    |

## VII. PACKING QUANTITY INFORMATION

T-90-20

## CERAMIC DUAL IN-LINE (CERDIP)

| PACKAGE CODE           | PIN COUNT        | QUANTITIES       |                 |
|------------------------|------------------|------------------|-----------------|
|                        |                  | DEVICES PER TUBE | DEVICES PER BOX |
| F/FE, BPA, PA          | 8-pin (300-mil)  | 48               | 1920            |
| F, BCA, CA             | 14-pin (300-mil) | 25               | 1000            |
| F, BEA, EA             | 16-pin (300-mil) | 25               | 1000            |
| F, BVA, MVA            | 18-pin (300-mil) | 21               | 840             |
| F/FA, BRA, RA          | 20-pin (300-mil) | 20               | 800             |
| F, BWA, WA             | 22-pin (400-mil) | 17               | 544             |
| F/FA/F6, BJA, JA       | 24-pin (600-mil) | 15               | 360             |
| F/FA/F3/F24, BLA, LA   | 24-pin (300-mil) | 15               | 600             |
| F, BXA, XA             | 24-pin (400-mil) | 15               | 480             |
| F/FA/F28, BXA, XA      | 28-pin (600-mil) | 13               | 312             |
| FA                     | 32-pin (600-mil) | 11               | 264             |
| F/FA/F40, BQA, MQA, QA | 40-pin (600-mil) | 9                | 216             |

## CERPAC

| PACKAGE CODE | PIN COUNT | QUANTITIES       |  |
|--------------|-----------|------------------|--|
|              |           | DEVICES PER TUBE |  |
| BDA/DA/W     | 14-pin    | 145              |  |
| BFA/FA/W     | 16-pin    | 145              |  |
| BXA/BYA/W    | 18-pin    | 100              |  |
| BSA/SA/W/WB  | 20-pin    | 100              |  |
| BKA/KA/W     | 24-pin    | 120              |  |
| BYA/YA/W     | 28-pin    | 50               |  |

## CERQUAD

| PACKAGE CODE | PIN COUNT | QUANTITIES       |                 |
|--------------|-----------|------------------|-----------------|
|              |           | DEVICES PER TRAY | DEVICES PER BOX |
| KA/K44       | 44-pin    | 6                | 6               |
| KA/K68       | 68-pin    | 4                | 4               |
| KA           | 84-pin    | 42               | 210             |

## LEADLESS CHIP CARRIER

| PACKAGE CODE            | PIN COUNT | QUANTITIES       |  |
|-------------------------|-----------|------------------|--|
|                         |           | DEVICES PER TUBE |  |
| B2A/2A/GA               | 20-pin    | 55               |  |
| B3A/3A/GA/GC1           | 28-pin    | 43               |  |
| YA/YA/GC2               | 32-pin    | 35               |  |
| BUA/MXA/MUA/UA/XA/GA/GC | 44-pin    | 27               |  |
| BZA/BUA/UA/ZA/GA/GC     | 68-pin    | 19               |  |

QUANTITIES SHOWN IN GRAY REQUIRE PURCHASE TO BE MADE IN EXACT MULTIPLES OF THAT QUANTITY.

## VII. PACKING QUANTITY INFORMATION

T-90-20

## PLASTIC DUAL IN-LINE

| PACKAGE CODE | PIN COUNT            | QUANTITIES       |                 |
|--------------|----------------------|------------------|-----------------|
|              |                      | DEVICES PER TUBE | DEVICES PER BOX |
| N/N8         | 8-pin (300-mil)      | 50               | 2000            |
| N/N14/N16    | 14- 16-pin (300-mil) | 25               | 1000            |
| N            | 18-pin (300-mil)     | 20               | 800             |
| N/N20        | 20-pin (300-mil)     | 18               | 720             |
| N            | 22-pin (400-mil)     | 17               | 544             |
| N/N6         | 24-pin (600-mil)     | 15               | 360             |
| N/N3/N24     | 24-pin (300-mil)     | 15               | 600             |
| N/N24        | 24-pin (400-mil)     | 15               | 480             |
| N/N28        | 28-pin (600-mil)     | 13               | 312             |
| N/N3         | 28-pin (300-mil)     | 13               | 520             |
| N            | 32-pin (600-mil)     | 11               | 264             |
| N/N40        | 40-pin (600-mil)     | 9                | 216             |
| NB (Shrink)  | 42-pin (600-mil)     | 12               | 288             |
| N/N48        | 48-pin (600-mil)     | 7                | 168             |
| N            | 50-pin (900-mil)     | 7                | 112             |
| N/N64        | 64-pin (900-mil)     | 5                | 80              |

## PLASTIC LEADED CHIP CARRIER (PLCC)

| PACKAGE CODE | PIN COUNT | QUANTITIES       |                 |                  |
|--------------|-----------|------------------|-----------------|------------------|
|              |           | DEVICES PER TUBE | DEVICES PER BOX | DEVICES PER REEL |
| A            | 20-pin    | 46               | 3680            | 1000             |
| A/A28        | 28-pin    | 37               | 2368            | 750              |
| A            | 32-pin    | 31               | 2232            | 750              |
| A/A44        | 44-pin    | 26               | 1248            | 500              |
| A/A52        | 52-pin    | 23               | 1012            | 500              |
| A/A68        | 68-pin    | 18               | 648             | 250              |
| A/A84        | 84-pin    | 15               | 420             | 250              |

QUANTITIES SHOWN IN GRAY REQUIRE PURCHASE TO BE MADE IN EXACT MULTIPLES OF THAT QUANTITY.

## VII. PACKING QUANTITY INFORMATION

T-90-20

## PLASTIC SMALL OUTLINE (SO)

| PACKAGE CODE | PIN COUNT        | QUANTITIES       |                 |                        |
|--------------|------------------|------------------|-----------------|------------------------|
|              |                  | DEVICES PER TUBE | DEVICES PER BOX | DEVICES PER REEL       |
| D/D8         | 8-pin (150-mil)  | 100              | 10000           | 2500                   |
| D            | 8-pin (300-mil)  | 64               | 2560            | 1000 - 13"<br>700 - 7" |
| D/D14        | 14-pin (150-mil) | 57               | 5700            | 2500                   |
| D            | 16-pin (150-mil) | 50               | 5000            | 2500                   |
| D            | 16-pin (300-mil) | 48               | 1920            | 1000                   |
| DK(SSOP)     | 20-pin (170-mil) | 75               | 6750            | 2500                   |
| D            | 20-pin (300-mil) | 38               | 1520            | 1000                   |
| D/D24        | 24-pin (300-mil) | 32               | 1280            | 1000                   |
| D            | 28-pin (300-mil) | 27               | 1080            | 1000                   |
| D            | 40-pin (VSO-40)  | 31               | 1240            | 1000 - 13"<br>300 - 7" |
| D            | 56-pin (VSO-56)  | 22               | 616             | 1000                   |

## QUAD FLAT PACK\*

| PACKAGE CODE | PIN COUNT                | QUANTITIES       |                 |
|--------------|--------------------------|------------------|-----------------|
|              |                          | DEVICES PER TRAY | DEVICES PER BOX |
| B/B44        | 44-pin                   | 50               | 500             |
| B/B44        | 44-pin                   | 96               | 480             |
| B            | 52-pin                   | 119              | 595             |
| B            | 80-pin                   | 66               | 330             |
| B            | 100-pin                  | 50               | 250             |
| B            | 120-pin                  | 24               | 120             |
| B            | 120-pin (Philips source) | 30               | 150             |

- \* Quad Flat Pack parts require dry pack handling according to EIA Standard - 583.  
These parts are identified in part list section with DRY PACK in the Cross Ref Part No field.

QUANTITIES SHOWN IN GRAY REQUIRE PURCHASE TO BE MADE IN EXACT MULTIPLES OF THAT QUANTITY.