**Preliminary Data Addendum**
**September 8, 1992**

AT&T Microelectronics

# AT&T High-Speed Data Pump Chip Sets
## 3.3 Volt Operation Addendum

## Introduction

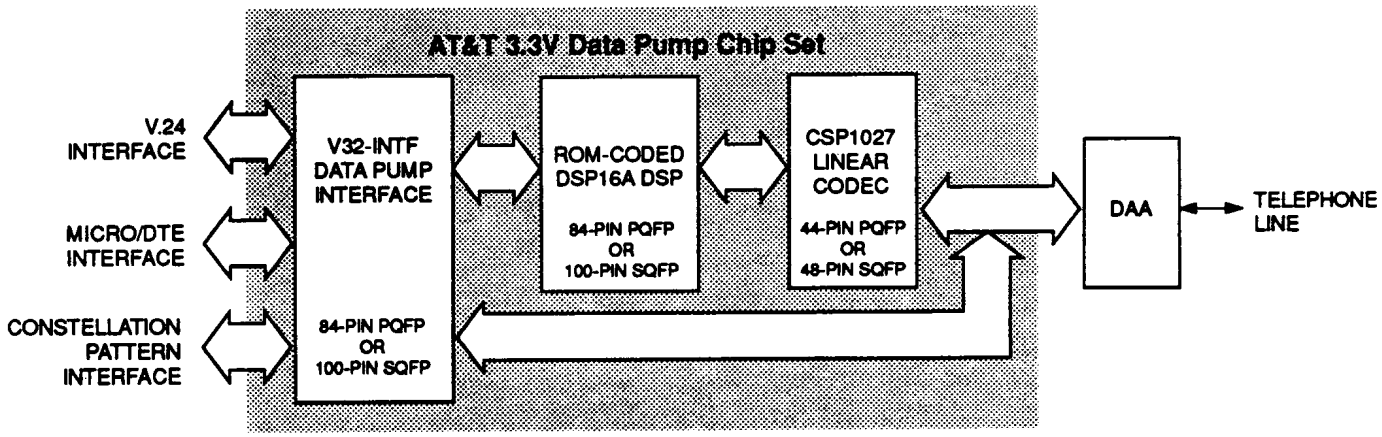
AT&T is now offering V.32bis plus V.17 FAX data pump chip sets that operate at 3.3 Volts for use in low power applications, such as laptop and notebook computer modems and PCMCIA card modems. The data pump supports high-speed data (V.32bis) and FAX (V.17) modes at speeds up to 14,400 bits/s. When operating at 3.3V, this chip set uses over 40% less power than current 5V designs. During typical operation, the 3.3V chip set requires only 260 mW of power.

The 3.3V data pump chip sets are available in two packaging options: plastic quad flat pack (PQFP) and skinny quad flat pack (SQFP). The SQFP packages are ideal for applications where space is at a premium, such as in PCMCIA card modems.

This document is to be used in conjunction with the AT&T High-Speed Data Pump Chip Sets Data Book (MN91-063DMOS, December 1991).

## Features

- Low power consumption:
  - — Typical active power consumption: 260 mW
  - — Sleep mode power consumption: 27 mW
- Data mode compatibilities:
  - — CCITT V.32bis: 14,400 (TCM), 12,000 (TCM), 7200 (TCM)
  - — CCITT V.32: 9600 (TCM), 9600 (QAM), 4800 (QAM)
  - — CCITT V.22bis: 2400 (QAM), 1200 (DPSK)
  - — CCITT V.22: 1200 (DPSK), 600 (DPSK)
  - — CCITT V.23: 1200 (FSK), 600 (FSK)
  - — CCITT V.21: 300 (FSK)
  - — Bell 212A: 1200 (DPSK)
  - — Bell 103: 300 (FSK)
- FAX mode compatibilities:
  - — CCITT V.17: 14,400 (TCM), 12,000 (TCM), 7200 (TCM)
  - — CCITT V.29: 9600 (QAM), 7200 (QAM)
  - — CCITT V.27ter: 4800 (DPSK), 2400 (DPSK)
  - — CCITT V.21 Channel 2: 300 (FSK)
- Voice-thru mode with GSM coder for applications such as PC-based answering machines




**The AT&T 3.3V Data Pump Chip Set includes a DSP16A Digital Signal Processor, a CSP1027 Linear Codec, and a V32-INTFC Interface Device.**

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## Ordering Information

| Part Number | Product Description |
|---|---|
| V32FBV-L3-FFJ | 3.3V V.32bis plus V.17 FAX in PQFP packages |
| V32FBV-L3-SSS | 3.3V V.32bis plus V.17 FAX in SQFP packages |



**Note:** The information in this document is preliminary. Please contact the AT&T modem marketing group for the latest information before starting your product design.

## Pin Information

For the 3.3V data pump, the T7525 codec used in previous AT&T data pumps is replaced with the CSP1027 codec. This codec is available in two packages, a 44-pin PQFP and a 48-pin SQFP. Figures 1 and 2 show the pin locations for these two packages.

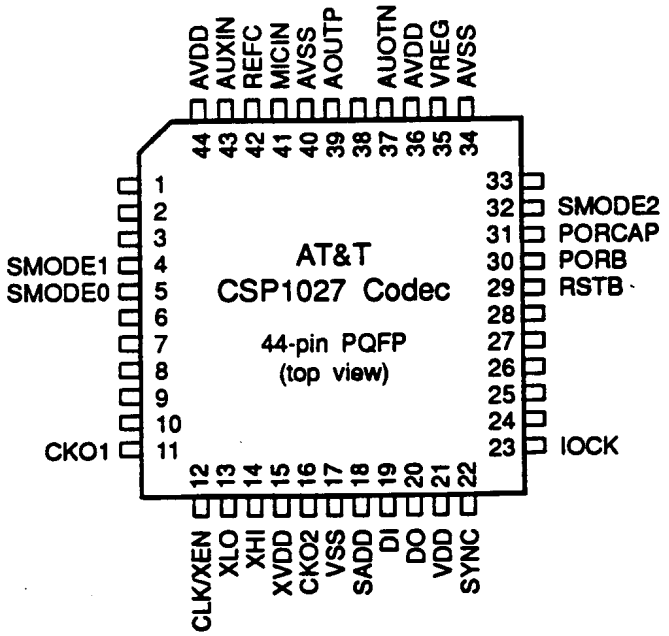



**Figure 1. CSP1027 (PQFP) Signal Locations**



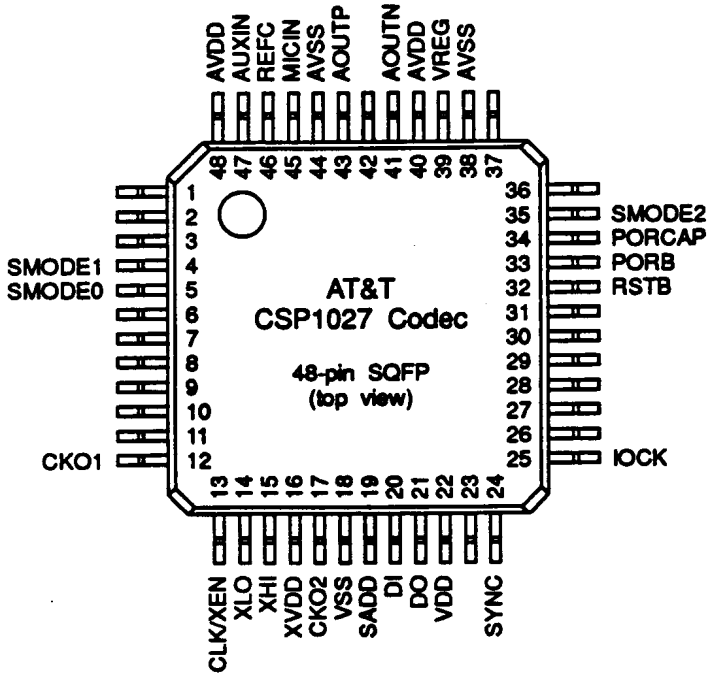



**Figure 2. CSP1027 (SQFP) Signal Locations**

## Pin Information (continued)

Figures 3 and 4 show the signal locations for both DSP16A Digital Signal Processor packages.

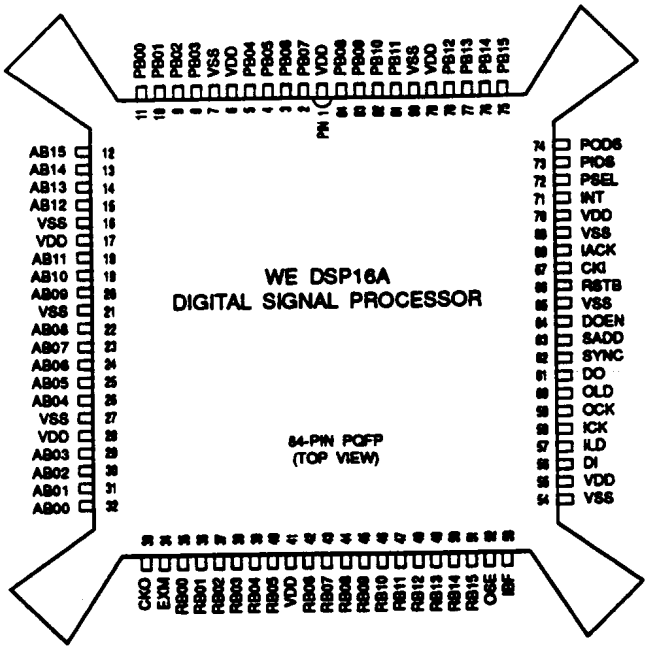



**Figure 3. DSP16A (PQFP) Signal Locations**

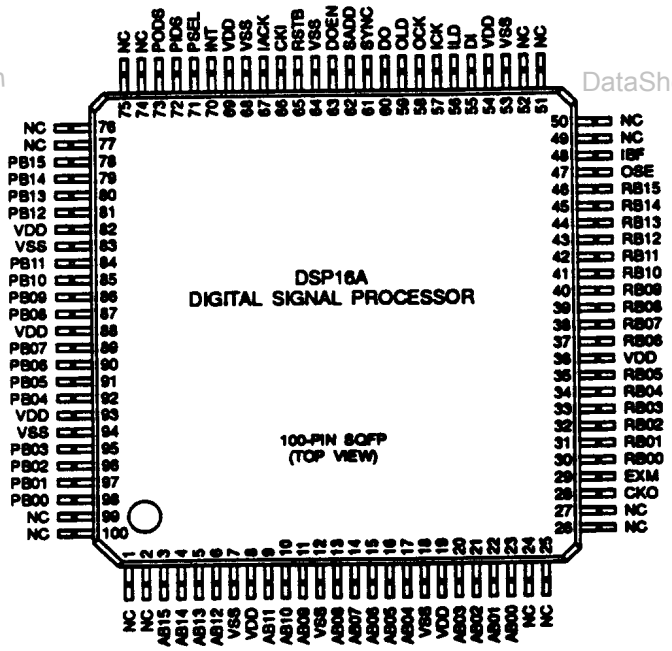



**Figure 4. DSP16A (SQFP) Signal Locations**

## Pin Information (continued)

Figures 5 and 6 show the signal locations for both V32-INTFC Interface Device packages.

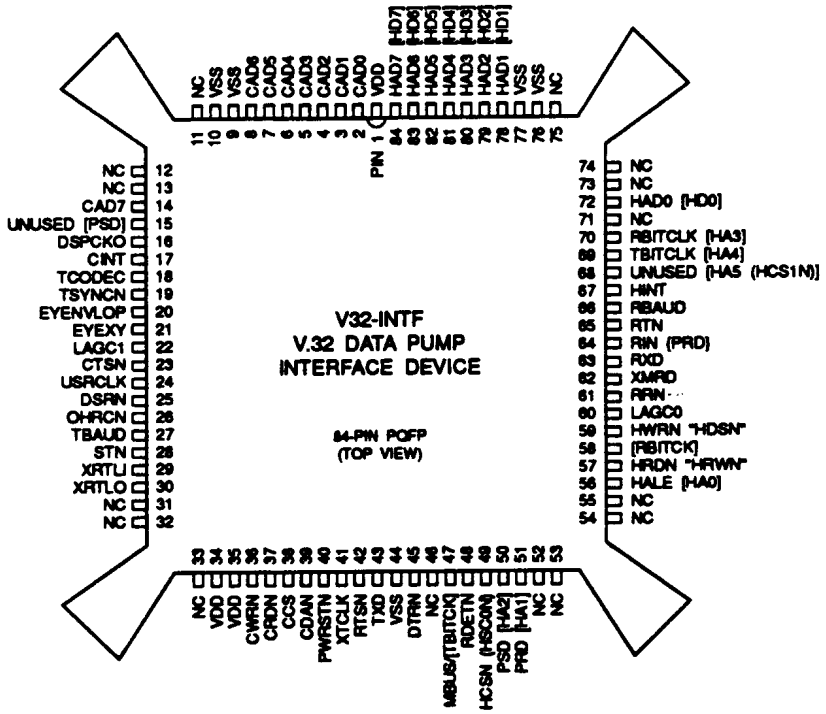



**Figure 5. V32-INTFC (PQFP) Signal Locations**

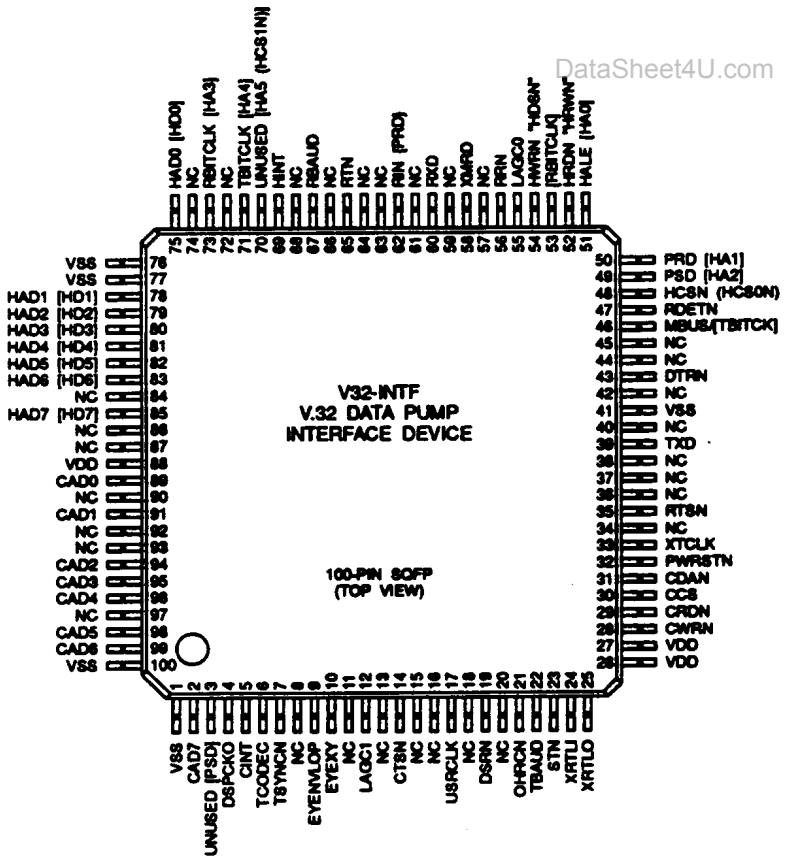



**Figure 6. V32-INTFC (SQFP) Signal Locations**

## Interconnect Circuitry

Figure 7 shows the interconnect circuitry for the 3.3 Volt data pump chip set.

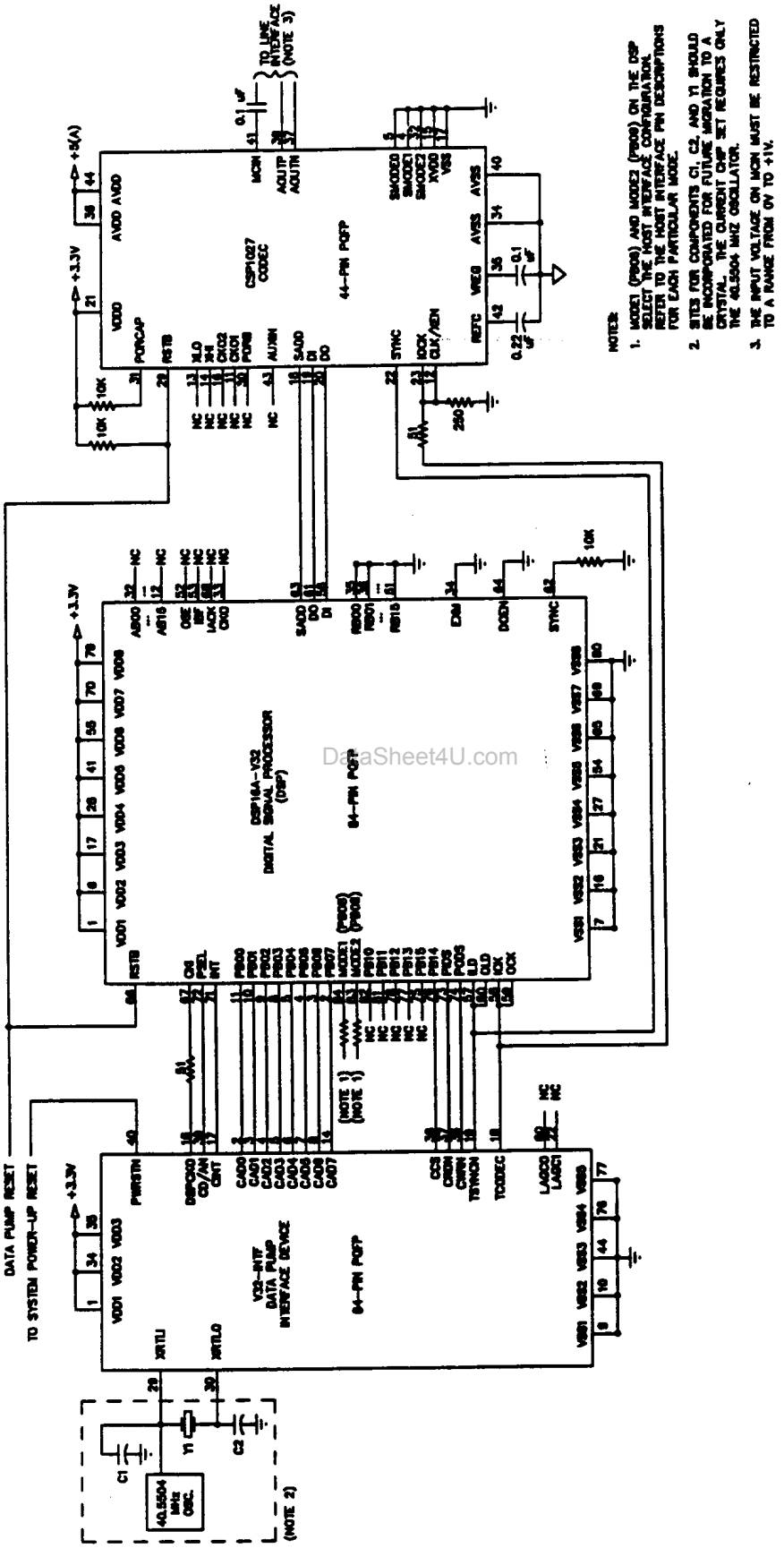



Figure 7. Data Pump Interconnect Circuitry

## Electrical Characteristics

The electrical and timing characteristics in this data sheet are preliminary and are subject to change.

Electrical characteristics are presented here for the entire chip set. These characteristics are valid when the chip set is connected as recommended in this data sheet. Additional information regarding the DSP16A DSP and the CSP1027 codec is available in their respective data sheets.

These parameters are valid for the following conditions:
$T_A$ = 0 to 70 °C, $V_{DD}$ = 3.3 V ± 0.3V (digital supply), $AV_{DD}$ = 5V ± 5% (analog supply), Vss = GND = $GND_A$ = 0 V
or
$T_A$ = 0 to 70 °C, $V_{DD}$ = 5 V ± 5% (digital supply), $AV_{DD}$ = 5V ± 5% (analog supply), Vss = GND = $GND_A$ = 0 V

| Parameter | Symbol | 5 Volts | | 3.3 Volts | | Unit |
|---|---|---|---|---|---|---|
| | | Min | Max | Min | Max | |
| Input Voltage (CMOS Inputs): | | | | | | |
| Low | $V_{IL}$ | — | 0.75 | — | 0.5 | V |
| High | $V_{IH}$ | $V_{DD}$ – 0.75 | — | $V_{DD}$ – 0.5 | — | V |
| Input Voltage (Schmitt Trigger*): (RDET and RTSN inputs): | | | | | | |
| Low | $V_{ILC}$ | — | 0.5 | — | 0.5 | V |
| High | $V_{IHC}$ | $V_{DD}$ – 0.5 | — | $V_{DD}$ – 0.5 | — | V |
| Output Low Voltage | $V_{OL}$ | — | 0.5 | — | 0.3 | V |
| Output Low Current | | | | | | |
| All pins except below: | $I_{OL}$ | — | 3 | — | 0.1 | mA |
| DSPCKO/POP1, PIP0/POP0, C16XCLK, TCODECK, TSYNCN: | $I_{OL}$ | — | 11 | — | 0.5 | mA |
| OHRCN: | $I_{OL}$ | — | 24 | — | 1.0 | mA |
| Output High Voltage | $V_{OH}$ | — | $V_{DD}$ – 0.5 | — | $V_{DD}$ – 0.3 | V |
| Output High Current | | | | | | |
| All pins except below: | $I_{OH}$ | — | 3 | — | 0.1 | mA |
| DSPCKO/POP1, PIP0/POP0, C16XCLK, TCODECK, TSYNCN: | $I_{OH}$ | — | 11 | — | 0.5 | mA |
| OHRCN: | $I_{OH}$ | — | 24 | — | 1.0 | mA |
| Input Leakage (no pull-up): | | | | | | |
| High ($V_{IH}$ = $V_{DDMAX}$) | $I_{IH}$ | — | 5 | — | 3 | µA |
| Low ($V_{IL}$ = 0.0 V) | $I_{IL}$ | –5 | — | –3 | — | µA |
| Input Loading (50 KΩ pull-up): | | | | | | |
| High ($V_{IH}$ = $V_{DDMAX}$) | $I_{LH}$ | — | 5 | — | 3 | µA |
| Low ($V_{IL}$ = 0.0 V) | $I_{LL}$ | –110 | — | –75 | — | µA |
| Output 3-state Current: | | | | | | |
| High ($V_{APPLIED}$ = $V_{DDMAX}$) | $I_{OZH}$ | — | 10 | — | 10 | µA |
| Low ($V_{APPLIED}$ = 0.0 V) | $I_{OZL}$ | –10 | — | –10 | — | µA |
| Capacitance: | | | | | | |
| Input Pins | $C_{IN}$ | — | 10 | — | 10 | pF |
| I/O Pins | $C_{IO}$ | — | 350 | — | 175 | pF |

* Schmitt Trigger has a maximum of 1.8V hysterisis at 5 Volts

# Electrical Characteristics (continued)

## Maximum Ratings

Stresses in excess of the Absolute Maximum Ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to Absolute Maximum Ratings for extended periods can adversely affect device reliability.

Voltage range on any pin with respect to ground ..... $V_{SS}$–0.3 to $V_{DD}$ + 0.3 V
Ambient temperature range ..... –40 to +125 °C
Storage temperature range ..... –40 to +125 °C

**Warning:** All CMOS devices are prone to latch-up if excessive current is injected to/from the substrate. To prevent latch-up at power-up, no input pin should be subjected to input voltages greater than $V_{IL}$, or less than $V_{SS}$–0.3 V before $V_{DD}$ is applied. After power-up, inputs should not be subjected to voltages greater than $V_{DD}$+0.3V or less than $V_{SS}$–0.3 V.

**Handling Precautions:** Buffers have been characterized for two types of ESD events: the human-body model (HBM) and the charged-device model (CDM). The Human-body model simulates the effect of a charge stored on a persons body being discharged to ground through the device. Devices are characterized for HBM and CDM by using the methodology prescribed by the AT&T spec X-19435, Issue 3. Devices are also characterized for HBM according to the methodology prescribed by MIL-STD 883C Method 3015.7, Notice 8.

### Chip Set Power Dissipation

The following table lists the power dissipation for the 3.3V data pump chip sets. Individual numbers are presented for each of the three devices in the set and for the set as a whole. Typical power dissipation assumes $V_{CC}$ = 3.3 V and $T_A$ = 30 °C. Maximum power dissipation assumes $V_{CC}$ = 3.6 V and $T_A$ = 70 °C. In both cases, the maximum capacitive loading (10 pF) was applied to all outputs. Both typical and maximum power dissipation measurements (for active mode) were performed while the data pump was operating in 9600 bits/s V.32 mode. During sleep mode power measurements, all device inputs were at CMOS levels.

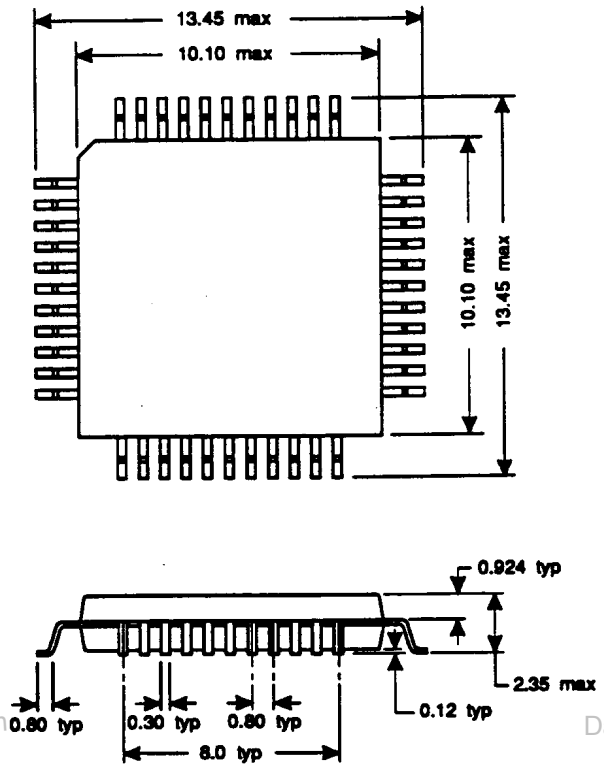
**Table 1. 3.3V Data Pump Power Dissipation**

| Device | Active Mode | | Sleep Mode | | Unit |
|---|---|---|---|---|---|
| | Typ | Max | Typ | Max | |
| DSP16A | 130 | 178 | 10 | 14 | mW |
| V32-INTF | 58 | 94 | 15 | 20 | mW |
| CSP1027 | 72 | 78 | 2 | 4 | mW |
| Total: | 260 | 350 | 27 | 38 | mW |

# Package Outline Diagrams

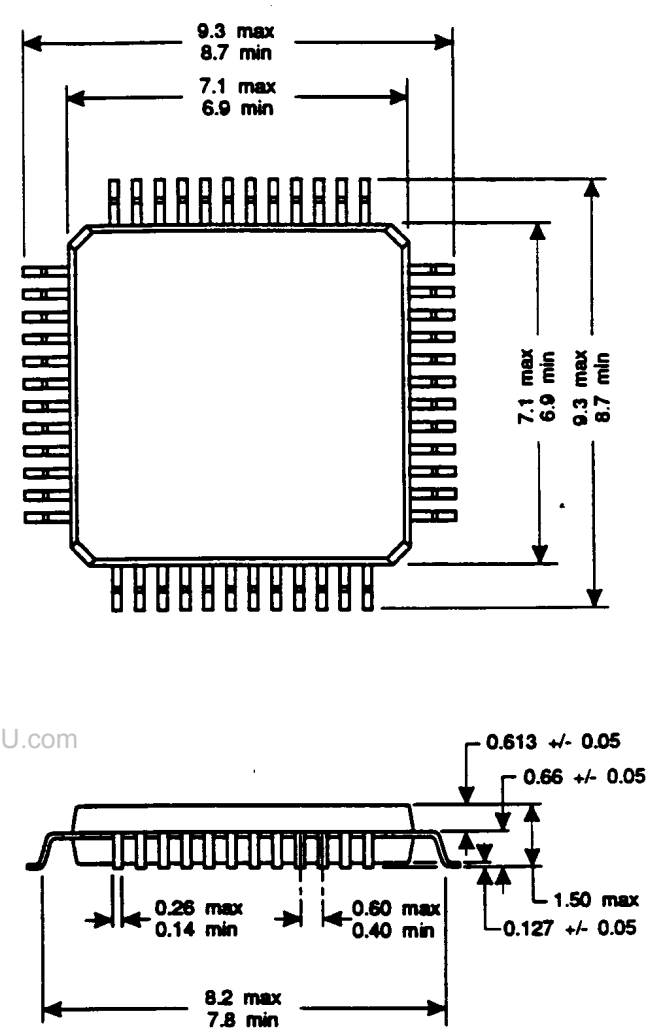
## 44-Pin PQFP Package (for CSP1027 Codec)

All dimensions are in millimeters.



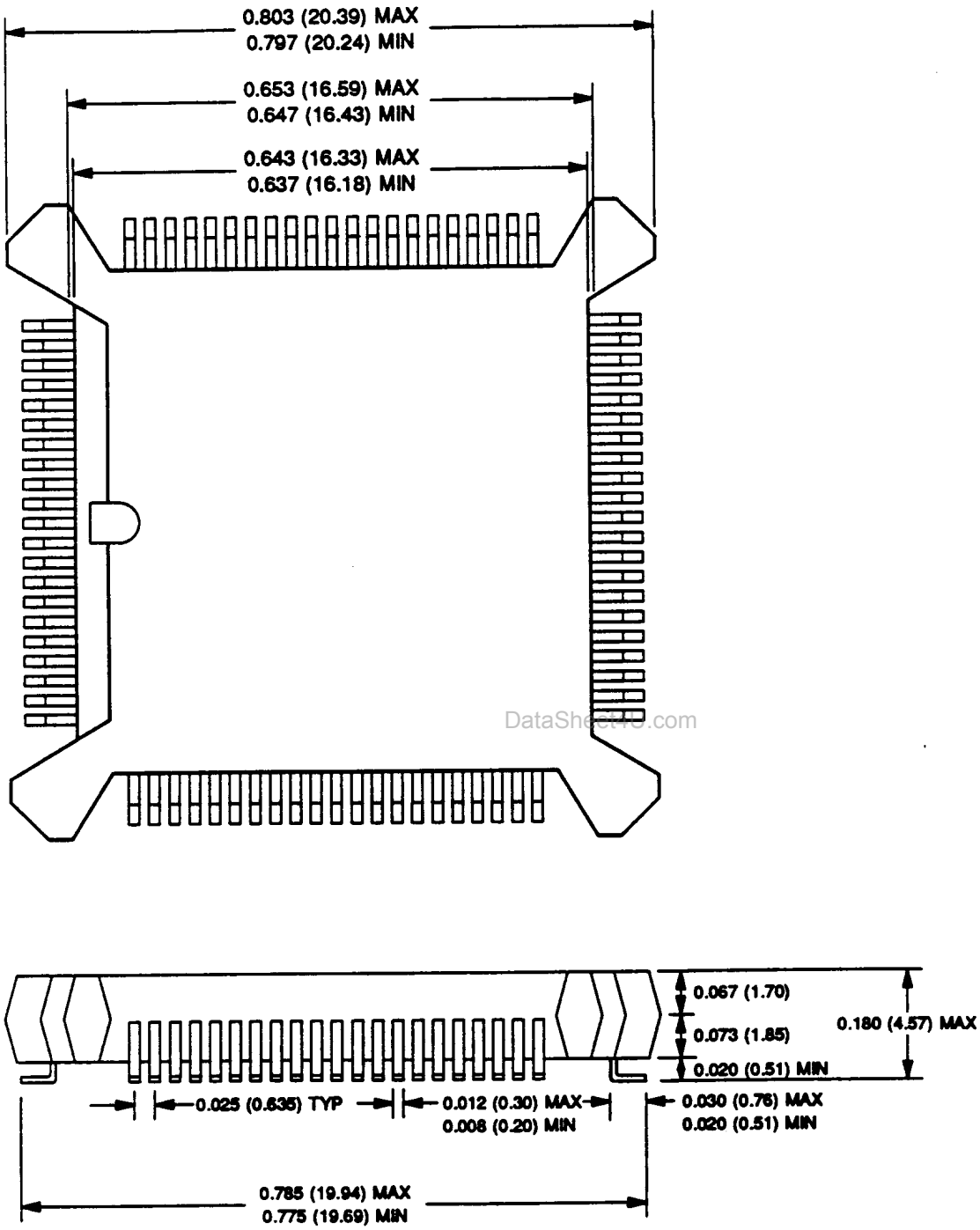

## 48-Pin SQFP (for CSP1027 Codec)

All dimensions are in millimeters.



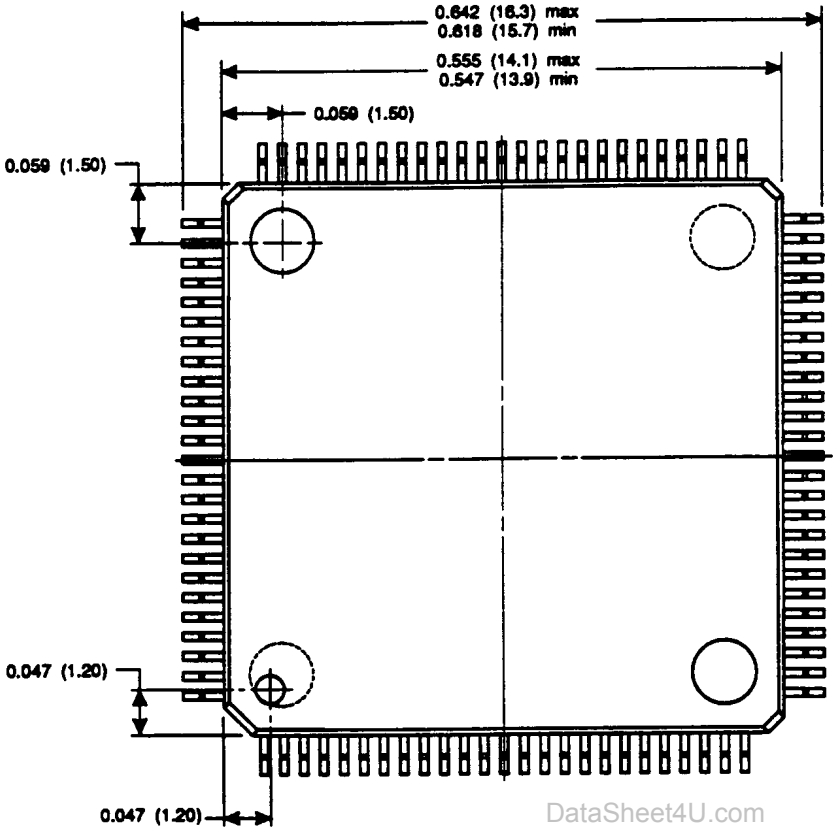
## Package Outline Diagrams (continued)

### 84-Pin PQFP (for DSP16A and V32-INTFC)

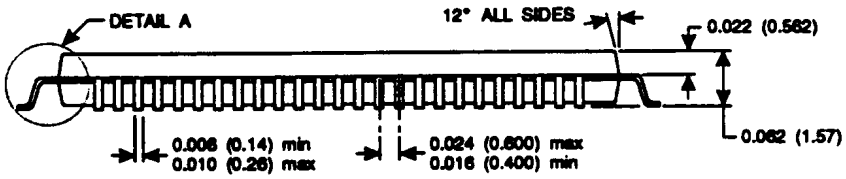


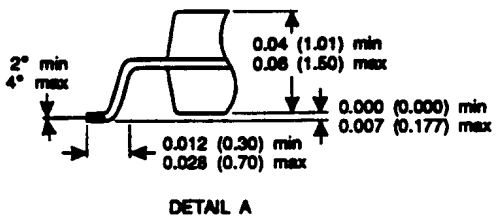
# Package Outline Diagrams (continued)

## 100-Pin SQFP (for DSP16A and V32-INTFC)






DETAIL A

Notes:
Molding flash is permitted around the periphery of body.
Flash shall not extend more than 0.01 (0.254) beyond body.

For additional information, contact your AT&T Account Manager or the following:
U.S.A.: AT&T Microelectronics, Dept. AL-520404200, 555 Union Boulevard, Allentown, PA 18103
1-800-372-2447, FAX 215-778-4106 (In Canada: 1-800-553-2448, FAX 215-778-4106)
EUROPE: AT&T Microelectronics, AT&T Deutschland GmbH, Bahnhofstr. 27A, D-8043 Unterfoehring, Germany
Tel. (49) 89 95086-0, FAX (49) 89 95086-333
ASIA PACIFIC: AT&T Microelectronics Asia/Pacific, 14 Science Park Drive, #03-02A/04 The Maxwell, Singapore 0511
Tel. (65) 778-8833, FAX (65) 777-7495, Telex RS 42898 ATTM
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Tel. (03) 5371-2700, FAX (03) 5371-3556
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