## PC Board Layout for Floating-Point Units

For applications requiring floating-point capability, National Semiconductor offers two options:

- The NS32381: A low-cost floating-point unit (FPU) which interfaces directly to the NS32532 microprocessor.
- The Weitek W3164: A high-performance floating-point solution which uses the NS32580 floating-point controller (FPC) to interface with the NS32532.

This application brief briefly explains how to lay-out a printed circuit (PC) board incorporating the NS32532 microprocessor and either FPU option. The board design provides maximum flexibility and can be used for either option.

Note: For detailed information regarding either the NS32381 FPU or the NS32580 FPC, refer to their data sheets.

The two FPU options are presented in *Figures 1* and 2. To provide both floating-point options with minimal printed circuit board real estate, the NS32580's pin-out was designed to be fully compatible with that of the NS32381 FPU. *Figure 3* illustrates this pin compatibility and the location of the keying pins.

As a result, the layout of the PC board can be prepared using Option 2, leaving the decision for the final floatingpoint configuration to the user. Users who prefer Option 1, will therefore be able to insert the NS32381 into the NS32580's socket, leaving U3's socket unpopulated. This method was implemented in the VME532 board designed by National Semiconductor.



FIGURE 1. Option 1, Using the NS32381 FPU

National Semiconductor Application Brief 40 Itzhak Nashelsky January 1989



TL/EE/10351-3

PC Board Layout for Floating-Point Units

Note: Since the NS32381's package is smaller than that of the NS32580, special care should be taken while inserting the NS32381 into the NS32580's socket.

Also, to prevent damage cause by "shifted" insertion, it is recommended that four keying-pins be installed in the NS32580 socket in the center area (see *Figure 3*).



TL/EE/10351-2 FIGURE 2. Option 2, Using the W3164 and NS32580 FPC

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	0	0
0	0	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	0	0
0	0	Х	Х	Κ						κ	Х	Х	0	0
0	0	Х	Х								Х	Х	0	0
0	0	Х	Х								Х	Х	0	0
0	0	Х	Х								Х	Х	0	0
0	0	Х	Х								Х	Х	0	0
0	0	Х	Х								Х	Х	0	0
0	0	Х	Х	Κ						Κ	Х	Х	0	0
0	0	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	0	0
0	0	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

x = Pins common to both NS32580 and NS32381.

- o = Pins belonging to the NS32580 only.
- k = Keying pins for the NS32381.

FIGURE 3. NS32580/NS32381 Pin-Out Compatibility

AB-4

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