The XC3300A/L, HardWire product has several mask options that need to be specified by the customer. These options are MAKEBITS options in the programmable versions.

The options must be specified in the XC3400A HardWire Design Verification Form and verified by Xilinx Applications before design signoff.

There are a total of eight mask options that must be selected:

1. INPUT VOLTAGE LEVELS

Just like the input buffers in the programmable versions, the input buffers can either be TTL or CMOS. This option is on a GLOBAL basis and NOT per input.

For XC3300L devices this option defaults automatically to CMOS since TTL level is not available for the "L" family.

2. CONFIGURATION TIME INTERVAL

This option sets the time interval between the initial power up condition and when the D/$\overline{P}$-pin goes High. The 64 μs option is for designs that are not dependent on how fast the HardWire device powers up and goes active. The 16 ms option emulates the initialization delay time of the programmable device. When the device is set as Master Mode, both of these periods are multiplied by 4 (this is to ensure that in designs containing multiple arrays in a daisy chain, the slave mode devices will be ready before the master device).

3. INTERNAL RESET RELEASES

There are three events that happen at start-up: I/Os go active, D/P- releases, and the internal reset signal releases. The release of the internal reset signal happens relative to the I/Os going active. This can be set either one CCLK cycle BEFORE the I/Os go active or one CCLK cycle AFTER the I/Os go active. The default condition is AFTER I/Os. Xilinx recommends this default option. In rare instances where the internal FFs need to be written prior to the output drivers going active, then BEFORE I/Os needs to be selected. "BEFORE I/O" cannot be used if the "Instant On" option was selected.

4. D/P-PULL-UP RESISTOR

The D/$\overline{P}$-resistor option MUST be selected if there is no external pull-up on this pin. The HardWire device depends on the state of the D/$\overline{P}$- feeding back into the device to start up the device. A high signal must be present for the HardWire to recognize the end of the "pseudo configuration" process.

5. OSCILLATOR

If the internal oscillator is used on the programmable design, choose the ACTIVE option. If the divide by 2 option is used, choose the ACTIVE/2 option.

6. MASTER MODE

This option is for programmable designs that use the Peripheral mode to program the array. Because the HardWire devices do *not* support Peripheral mode emulation, and the M0 pin in Peripheral mode is either tied High or pulled up, the HardWire device needs to be selected as a Master for it to start up. By selecting this option, the HardWire device ignores the state of the M0 pin and assumes it is a Master mode device and starts up on its own. For designs that use Slave mode or any of the Master mode configuration schemes, this option should be turned off, since the M0 pin will be tied to the proper level.

If the array configures in slave mode, the system still needs to provide CCLK to the HardWire device.

7. M1 "NORMAL" MODE POLARITY OPTION

This option works in conjunction with the Boundary Scan enable option. The user selects whether the M1 pin interprets "normal" mode to be a HIGH or LOW signal.

8. IN ADDITION, THE XC3300A/XC3000L DEVICES SUPPORT IEEE 1149.1 COMPATIBLE BOUNDARY SCAN INSTRUCTIONS. To access this feature, one of the following options must be selected.

Enable Boundary Scan:
1. ALWAYS enable
2. Active when M1 is Low
3. Active when M1 is High
4. Not Used

If ALWAYS is selected, the BSCAN pins are permanent by Boundary Scan test pins.

If Active when M1 is LOW is selected, the device will stay in BSCAN test mode as long as the M1 pin is driven High. If Active when M1 is HIGH is selected, the device will stay in BSCAN test mode as long as the M1 pin is driven Low. i.e. during the start-up phase (after initialization state), the device will enter BSCAN mode when it samples the M1 pin and finds it to be in the BSCAN active state. When M1 is driven back to the opposite state, the BSCAN pins go back to user I/Os.

If the Boundary Scan feature is not used, select the NOT USED option.