
ispGDS **Compiler Support**

Introduction

To simplify the development of ispGDS designs, Lattice Semiconductor offers an ispGDS assembler named "GASM" which processes the input ASCII files to generate the JEDEC compatible fusemap files required for the ispGDS devices. ispGDS assembler software is available at no cost from the Lattice Semiconductor BBS at 503-693-0215 under GDSPKG.ZIP file. This software is also available on diskette by calling the Lattice Semiconductor Hotline at 1-800-327-8425 (FASTGAL). For design engineers familiar with standard third-party compiler software packages, ABEL from Data I/O and CUPL from Logical Devices also support all ispGDS devices.

Using the ispGDS Compiler

The compiler will accept an ASCII text file containing the ispGDS programming instructions, and will create JEDEC and .DOC files. Once a JEDEC file has been created, the ispGDS device can be programmed by either downloading the JEDEC file to a programmer, or by using the ispGDS Download utility to program the device using the parallel port of an IBM compatible PC.

Compiler Syntax

The basic compiler syntax supports inserting comments, title, device type, pin assignments and input/output assignments. The ispGDS compiler source file comment lines are denoted with quote marks at the beginning of the comment lines. The title is defined with the key word "title = ". Any text following the "title =" key word that are within single quotes are defined to be the title of the design. Similarly, the device type is defined by the key word "device =" followed by the three valid device types -- ispgds22, ispgds18, ispgds14. The compiler syntax also allows the user to assign pin names by typing in a 10 character pin name followed by at least a single space, the "pin" key word and the pin number. This pin assignment is optional since the compiler syntax allows the user to use the "pin" key word and the pin number directly in the input/output assignments.

The output pins are assigned on the left side of the equation and the input pins are assigned on the right side of the equation. To assign an output pin to either high or low, simply assign "H" or "L" respectively on the right side of the equation. If you need to assign an input pin to

multiple output pins, use one line for each assignment, as shown in the following example. In the example below, pin 28 is an input that is routed to three outputs — pin 1, pin 2 and pin 3. Further, each output's polarity can be individually defined. The example shows pin 3 as an active low polarity whereas pin 1 and pin 2 are defined to be active high polarity. An example source file is appended at the end of this document.

```
pin 1 = pin 28
pin 2 = pin 28
!pin 3 = pin 28
```

Assembling a File

To use the assembler, create an ASCII ispGDS source file, then invoke the assembler from the DOS command line. For example: `gasm <test.gds>`

where test.gds is the name of the ispGDS source file. GASM will create a JEDEC file with the same base name, and a .JED extension, like "test.jed," and a doc file with a .DOC extension, like "test.doc."

Programming the ispGDS

You can either program the ispGDS using a JEDEC file output from the GASM assembler, or by using the GDS_PROG routines included in the GDSPKG software package. To program the ispGDS using a programmer, follow these steps:

1. Create an ASCII ispGDS source file
2. Assemble the ispGDS file using the ispGDS assembler (GASM).
3. Download the JEDEC file created by the assembler to the programmer and program the device. The JEDEC file will have the same name as your ispGDS source file, but will have a .JED extension (for example, "test.jed").

Alternatively, you may want to program the ispGDS devices either through the parallel port of an IBM compatible PC, or through some custom hardware configuration. The routines included in the ispGDS compiler software package are configured to use the PC parallel port for programming. If you want to use a custom hardware configuration, read through the comments in GDS_PROG for information on which routines need to be modified. If you are programming using the PC, you will

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need an ispDOWNLOAD™ Cable and ISP programming interface signals on the circuit board which will plug into the printer port on your PC.

To program using the parallel port of the PC, follow these steps:

1. Create an ASCII ispGDS source file
2. Assemble the ispGDS file using the ispGDS assembler (GASM)
3. Convert the JEDEC file to ispSTREAM format by running JEDTOISP. See the documentation on JEDTOISP for further information.
4. Run GDS_PROG to program the device using the PC parallel port.

ispGDS Source Format

The following text is an example of an ispGDS source file.

```
"This is a comment (line begins with quote mark)
title = 'DIP SWITCH REPLACEMENT CONFIGURATION'

" the ispgds device type (ispgds22, ispgds18, ispgds14)
device = ispgds22

" pin names are defined as follows
pin_name  pin 28

" pin 1 is an output connected to pin 28
pin 1 = pin_name
pin 2 = pin 27

" pin 3 is another output connected to pin 28
pin 3 = pin 28

" pin 5 is always high
pin 5 = h

"pin 6 is always low
pin 6 = l
pin 8 = pin 22

"! defines the inverted output for pin 9
!pin 9 = pin 20

pin 10 = pin 19
pin 12 = pin 17
pin 13 = pin 16
pin 14 = pin 15
```

Notes

If you get an error regarding "pin 0", you may have duplicated an output pin assignment (by assigning different input signals to the same output pin). Refer to the line number in the assembler error message to locate the source of the problem.



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