

# Lattice ISP™ Simplified Manufacturing

Program Lattice ISP Devices on Your  
GenRad Automatic Test Equipment



## GenRad

ATE programming of Lattice ISP devices cuts costs, reduces overhead and increases reliability.

- Eliminate Stand-alone Programming Steps
- Improve System Quality
- Simplify PLD Inventory Requirements
- Enhance Board Level Testing



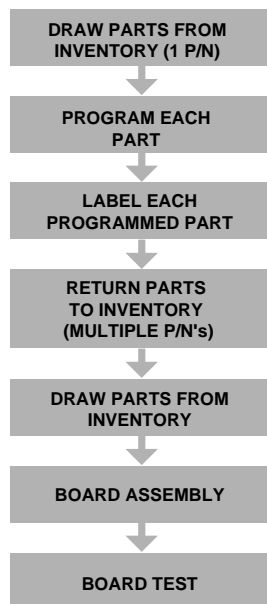
## Introduction

Lattice's In-System Programmable (ISP™) devices are revolutionizing the way companies design and manufacture systems. Lattice ISP devices allow manufacturers to simplify their standard manufacturing flow — reducing cost and enhancing system quality.

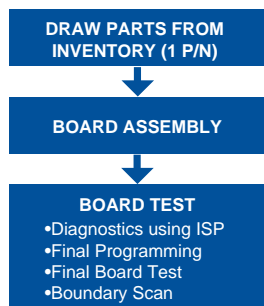
Lattice offers a broad range of ISP solutions. Lattice's ispLSI® 1000, 2000 and 3000 Families, with logic densities up to 14,000 gates, are the fastest High Density Programmable Logic devices in the industry. Lattice's ispGAL®22V10 device has all the advantages of ISP and maintains the familiar 22V10 architecture and 28-pin PLCC pinout. The ispGDS™ is Lattice's latest family of ISP devices that contain a programmable switch matrix which can connect signals arbitrarily between two banks of I/O pins or force pins to fixed high or low logic states.

## Revolutionize Your Manufacturing Flow

### Standard Flow Using Non-ISP Devices



### Enhanced Flow Using Lattice ISP Devices



- REDUCED INVENTORY
- HIGHER QUALITY
- 20% COST SAVINGS\*

\*Source: ISP Cost-of-Ownership Analysis

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## ATE Programming Support

One of the key advantages of Lattice ISP technology is the ability to program and test ISP devices using your Automatic Test Equipment (ATE). By using an ATE to perform production programming of Lattice ISP devices, you eliminate the time and overhead associated with stand-alone device programmers. In addition, you can enhance board-level quality and reliability by developing custom programs for ISP devices specifically for first-pass diagnostic board-level testing — then reconfigure the Lattice ISP devices to the final functional pattern to complete your product test.

GenRad's 228X Production Test Systems provide an ideal platform for implementing Lattice ISP programming on your factory floor. GenRad's reputation for providing high productivity in test and diagnostics also extends to programming of Lattice ISP devices. Lattice ISP devices are programmed through a single ISP interface consisting of four or five TTL-level signals. Since the Lattice ISP interface requires no "supervoltages", it is easily driven by the GenRad testers.

To program Lattice ISP devices on a GenRad board tester, you simply create industry standard JEDEC files for the ISP devices using your current PLD logic design software. You then use Lattice's ispTEST™ software utility which automatically translates the JEDEC files into GenRad-generic format vectors. These vectors are then translated into model specific test vectors to be downloaded to the GenRad tester and used to program and test Lattice ISP devices during board-level test. ispTEST software from Lattice and the GenRad ISP vector translator are both available free of charge.

Using a GenRad tester to program Lattice ISP devices as part of your manufacturing flow requires no additional hardware or ATE operator training. Lattice and GenRad applications engineers are available to help you integrate programming of Lattice's ISP devices into your test environment to ensure you receive the productivity, cost and quality benefits that ISP technology offers.

## GenRad Test Vector File

```
/*
Contents of configuration file test.cfg
*/
/*62783 Vectors*/
DECLARE GROUP VECTOR(113,834,786,50);
/*VECTOR=(ISPEN,MODE,SCLK,SDI)*/
ISP: SET CLOCK TINC=50N NINC=10,20
DST(D0,S6),(D0,S15);
ISP_B1: BURST NAME='ISP' ACTIVE MAXTIME=0;
/** PIN TYPE NAIL COMMENTS
1 OUT 97 SDO
2 IN 113 ISPEN
3 IN 834 MODE
4 IN 786 SCLK
5 IN 50 SDI **/
FAST;
IC(50,113,786,834);
IC(VECTOR) IG(VECTOR = B'0000') ;
IG(VECTOR = B'0001') ;
IG(VECTOR = B'0101') ;
IG(VECTOR = B'0100') ;
IG(VECTOR = B'0100') ;
IG(VECTOR = B'0110') ;
GOSUB WAIT200;
/***** Vectors continue *****/
END FAST;
FASTSUB WAIT200;
FLOOP(2) = 200 ;
TS(2) FLOOP(3) = 1000 ;
TS(2) END FLOOP;
END FLOOP; END FASTSUB WAIT200;
FASTSUB WAIT1;
FLOOP(2) = 1 ;
TS(2) FLOOP(3) = 1000 ;
TS(2) END FLOOP;
END FLOOP; END FASTSUB WAIT1;
FASTSUB WAIT40;
FLOOP(2) = 40 ;
TS(2) FLOOP(3) = 1000 ;
TS(2) END FLOOP;
END FLOOP; END FASTSUB WAIT40;
END BURST;
```

## GenRad Testers Supported

All GR228X Production Test Systems

## Contacts

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