



OpenCores.Org

Random Number Generator Library User Guide

*Author: Geir Drange
gedra@opencores.org*

**Rev. 1.0
September 28, 2004**

This page has been intentionally left blank.

Revision History

Rev.	Date	Author	Description
1.0	02/09/04	Geir Drange	First version

Contents

1 INTRODUCTION.....	1
2 USING THE LIBRARY.....	2
2.1 SEEDS	2
3 EXAMPLE TEST	3
4 KNOWN ISSUES.....	6

1

Introduction

When writing test benches, it is often useful to include a degree of randomness in the simulation. Typical examples are:

- Random data generation
- Adding noise to signals
- Generate random delays
- Clock jitter generation
- Etc

VHDL does not have any built-in functions for random numbers (yet). The Random Number Generator Library can easily be included in a test bench to supply random number functions.

Note that this library will NOT synthesize. It is intended for test bench use only.

2

Using the library

To use the library, add the following line to the test bench:

```
use work.rng_lib.all;
```

A random variable is defined by a record, and must be initialized before use. There is a separate initialization function for each type of distribution. Example:

```
r_uni := init_uniform(0, 0, 0, 0.0, 200.0);
```

will initialize a uniform distributed variable with values between 0 and 200. The random variable (real) is accessed by the .rnd member of the record:

```
r := r_uni.rnd; -- r is a real
```

```
i := integer(r_uni.rnd); -- i is an integer
```

Generate a new number with the rand() function:

```
r_uni := rand(r_uni);
```

2.1 Seeds

The first 3 parameters (a, b, c) for the initialization functions are seeds for the Tausworthe generators. If a seed is set to zero, a predefined seed will be used. Predefined seeds will also be used if $a < 3$, $b < 9$ or $c < 17$.

3

```

*
* *
* * * * *
* * * * * * * * *
* * * * * * * * * * *
* * * * * * * * * * * * *
* * * * * * * * * * * * * * *
* * * * * * * * * * * * * * * *
* * * * * * * * * * * * * * * *
* * * * * * * * * * * * * * * *
* * * * * * * * * * * * * * * *
* * * * * * * * * * * * * * * *
* * * * * * * * * * * * * * *
* * * * * * * * * * * * *
* * * * * * * * * * *
* *
*

```

```
* * * * *
* * * * *
* * * * *
* * * * *
* * * * *
* * * * *
* * * * *
* * * * *
* * * * *
* * * * *
```


4

Know issues

The library will not work with Symphony EDA Sonata simulator. Due to bad floating point support?