SYMPL Compute Engines

Floating-Point Pseudo-Random Number Generator

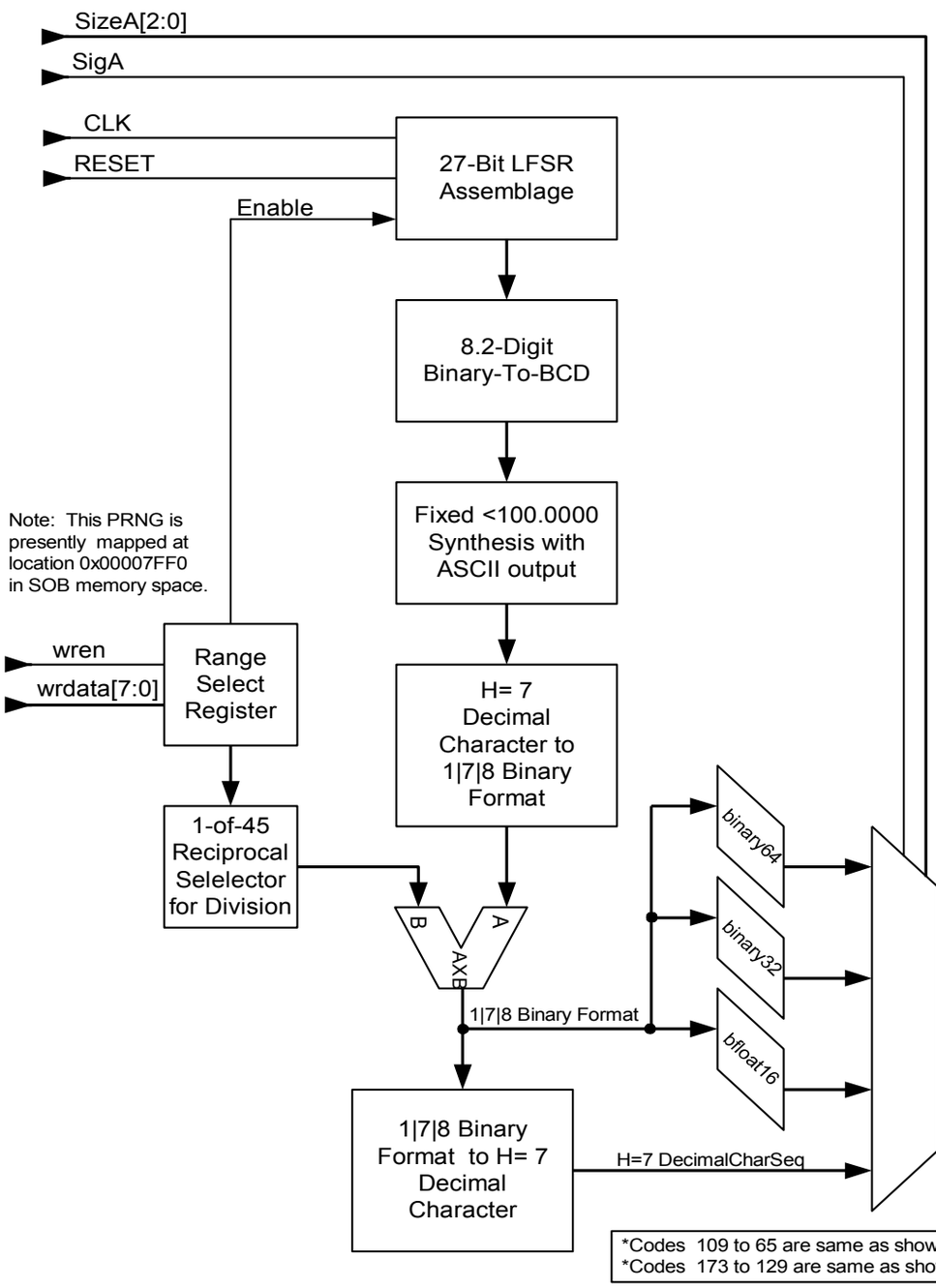
With Programmable Range and Output Formats

Preliminary Information

Features

- Ideal for initializing weights in artificial neural networks or providing stimulus in exercising floating-point operators in development.
- Forty-five selectable maximum magnitude ranges from < 100 down to < 0.0001. A code of 000 suspends generation.
- Selectable output formats include human-readable H=7 Decimal Character Sequence (DCS), binary64, binary32 and bfloat16.
- First binary formatted number is available for reading just 16 clocks after release of RESET or update of PRNG Range select register.
- A new binary formatted or decimal character sequence number is available for reading every clock cycle, meaning it can be used with the REPEAT instruction to quickly create a randomized weight vector.
- Employs single-character "token" exponents to conserve characters in 8-character (8-byte) sequence. *E.g.*, "A" = "e+01", "B" = "e+02", etc., and "a" = "e-01", "b" = "e-02", "g" = "e-07", etc., all relative to last digit.
- All numbers generated by this PRNG, including human-readable decimal character sequences, are directly computable by SOB without explicit conversion beforehand, as they are automatically converted to binary format in the pipeline.

PRNG	Value
6665039a	666503.9
5822754b	58227.54
1953126c	1953.126
3476563d	347.6563
1372071e	13.72071
3466797f	3.466797
8789062g	.8789062
3417969h	.03417969
2407226A	2407226e+01
2929687B	2929687e+02
1165771C	1165771e+03
2558594D	2558594e+04
8007812D	8007812e+05
1198730F	1198730e+06
1763916G	1763916e+07
9921875H	9921875e+08
27246097	27246097



Code*	Magnitude
045	< +100
044	< +75.0
043	< +50.0
042	< +25.0
041	< +10.0
040	< +7.5
039	< +5.0
038	< +3.5
037	< +2.0
036	< +1.75
035	< +1.50
034	< +1.250
033	< +1.0
032	< +0.75
031	< +0.50
030	< +0.35
029	< +0.20
028	< +0.175
027	< +0.150
026	< +0.125
025	< +0.10
024	< +0.075
023	< +0.05
022	< +0.035
021	< +0.020
020	< +0.0175
019	< +0.0150
018	< +0.0125
017	< +0.01
016	< +0.0075
015	< +0.005
014	< +0.0035
013	< +0.0020
012	< +0.00175
011	< +0.0015
010	< +0.00125
009	< +0.001
008	< +0.00075
007	< +0.0005
006	< +0.00035
005	< +0.00020
004	< +0.000175
003	< +0.00015
002	< +0.000125
001	< +0.0001
000	Suspend

*Codes 109 to 65 are same as shown respectively, except all negative.
*Codes 173 to 129 are same as shown respectively, except randomly +/-.