

```

timescale 1ns / 1ps
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
// Company:
// Engineer:
//
// Create Date: 12/01/2020 10:37:20 PM
// Design Name:
// Module Name: Comparator
// Project Name:
// Target Devices:
// Tool Versions:
// Description:
//
// Dependencies:
//
// Revision:
// Revision 0.01 - File Created
// Additional Comments:
//
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////

// Test Passed

module Comparator(
    input [15:0] A,
    input [15:0] B,
    output EQ, LT
);

    wire [15:0] e;
    wire [15:0] l;

    Compare bit15(.a(A[15]), .b(B[15]), .eq(e[15]), .lt(l[15]));
    Compare bit14(.a(A[14]), .b(B[14]), .eq(e[14]), .lt(l[14]));
    Compare bit13(.a(A[13]), .b(B[13]), .eq(e[13]), .lt(l[13]));
    Compare bit12(.a(A[12]), .b(B[12]), .eq(e[12]), .lt(l[12]));
    Compare bit11(.a(A[11]), .b(B[11]), .eq(e[11]), .lt(l[11]));
    Compare bit10(.a(A[10]), .b(B[10]), .eq(e[10]), .lt(l[10]));
    Compare bit9(.a(A[9]), .b(B[9]), .eq(e[9]), .lt(l[9]));
    Compare bit8(.a(A[8]), .b(B[9]), .eq(e[8]), .lt(l[8]));
    Compare bit7(.a(A[7]), .b(B[7]), .eq(e[7]), .lt(l[7]));
    Compare bit6(.a(A[6]), .b(B[6]), .eq(e[6]), .lt(l[6]));
    Compare bit5(.a(A[5]), .b(B[5]), .eq(e[5]), .lt(l[5]));
    Compare bit4(.a(A[4]), .b(B[4]), .eq(e[4]), .lt(l[4]));
    Compare bit3(.a(A[3]), .b(B[3]), .eq(e[3]), .lt(l[3]));
    Compare bit2(.a(A[2]), .b(B[2]), .eq(e[2]), .lt(l[2]));
    Compare bit1(.a(A[1]), .b(B[1]), .eq(e[1]), .lt(l[1]));

```

```

Compare bit0(.a(A[0]), .b(B[0]), .eq(e[0]), .lt(l[0]));

assign EQ = &e;
assign LT = l[15] |
e[15] & l[14] |
e[15] & e[14] & l[14] |
e[15] & e[14] & e[13] & l[12] |
e[15] & e[14] & e[13] & e[12] & l[11] |
e[15] & e[14] & e[13] & e[12] & e[11] & l[10] |
e[15] & e[14] & e[13] & e[12] & e[11] & e[10] & l[9] |
e[15] & e[14] & e[13] & e[12] & e[11] & e[10] & e[9] & l[8] |
e[15] & e[14] & e[13] & e[12] & e[11] & e[10] & e[9] & e[8] & l[7] |
e[15] & e[14] & e[13] & e[12] & e[11] & e[10] & e[9] & e[8] & e[7] & l[6] |
e[15] & e[14] & e[13] & e[12] & e[11] & e[10] & e[9] & e[8] & e[7] & e[6] & l[5] |
e[15] & e[14] & e[13] & e[12] & e[11] & e[10] & e[9] & e[8] & e[7] & e[6] & e[5] & l[4] |
e[15] & e[14] & e[13] & e[12] & e[11] & e[10] & e[9] & e[8] & e[7] & e[6] & e[5] & e[4] & l[3] |
e[15] & e[14] & e[13] & e[12] & e[11] & e[10] & e[9] & e[8] & e[7] & e[6] & e[5] & e[4] & e[3] & l[2] |
e[15] & e[14] & e[13] & e[12] & e[11] & e[10] & e[9] & e[8] & e[7] & e[6] & e[5] & e[4] & e[3] & e[2] & l[1] |
e[15] & e[14] & e[13] & e[12] & e[11] & e[10] & e[9] & e[8] & e[7] & e[6] & e[5] & e[4] & e[3] & e[2] & e[1] & l[0]

endmodule

```