

```
timescale 1ns / 1ps
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
// Company:
// Engineer:
//
// Create Date: 05/23/2022 05:05:02 PM
// Design Name:
// Module Name: vga_setup
// Project Name:
// Target Devices:
// Tool Versions:
// Description:
//
// Dependencies:
//
// Revision:
// Revision 0.01 - File Created
// Additional Comments:
//
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
```

```
module vga_setup(
    input clock,

    output [3:0] vgaRed,
    output [3:0] vgaBlue,
    output [3:0] vgaGreen,
    output Hsync,
    output Vsync,

    output [10:0] Hpixel,
    output [10:0] Vpixel,
    output new_frame
);

//set bounds
wire [10:0] Hbound1, Hbound2;
wire [10:0] Vbound1, Vbound2;

assign Hbound1 = 11'd655;
assign Hbound2 = 11'd750;

assign Vbound1 = 11'd489;
assign Vbound2 = 11'd490;
```

```

wire [10:0] Hreset;
wire [10:0] Vreset;

wire Hactive;
wire Vactive;
wire active;
wire [15:0] hOut;
wire [15:0] vOut;

assign Hactive = (hOut < 10'd640);
assign Vactive = (vOut < 10'd480);
assign active = Hactive && Vactive;

assign Hreset = 10'd799;
assign Vreset = 10'd524;

//count pixels
countUD16L Hori (.clk(clock), .Up(1'b1), .Dw(1'b0), .LW(Hreset == hOut),
.d(16'h0000), .q(hOut));
countUD16L Vert (.clk(clock), .Up(Hreset == hOut), .Dw(1'b0), .LW(Vreset == vOut
& Hreset == hOut), .d(16'h0000), .q(vOut));

assign Hsync = (hOut < Hbound1) || (hOut > Hbound2);
assign Vsync = (vOut < Vbound1) || (vOut > Vbound2);

assign Hpixel = hOut [10:0];
assign Vpixel = vOut [10:0];

assign new_frame = (Vpixel == 11'd0 & (Hpixel == 11'd0 | Hpixel == 11'd4 |
Hpixel == 11'd8 )) ? 1'b1 : 1'b0;

assign vgaRed = 4'b1111 & {4{active}};
assign vgaBlue = 4'b1111 & {4{active}};
assign vgaGreen = 4'b1111 & {4{active}};

endmodule

```