PAWS for ULX3S

Risc-V RV32IMC CPU
+ DISPLAY & I/O

PAWS CPU - Risc-V RV32IMC

| COMPRESSED INSTRUCTION EXPANDER | INSTRUCTION DECODER | ADDRESS GENERATOR | BIT COMBINER 2 x 16 bit -> 32 bit | BRANCH DECIDER | REGISTER FILE | RISC-V I ALU RISC-V M DIVIDER RISC-V M DSP MULTIPLIER |

MEMORY ARBITRATOR

SIGN EXTENDER

MEMORY
BRAM 16K
BIOS / Stack
SDRAM 32MB
4k I Cache
4K D Cache

H D M I   D I S P L A Y

BITMAP
640x480
64 colour
ALPHA CHANNEL

GPU
Pixel
Blitter
(Filled) Circle
Line
Filled Rectangle
Filled Triangle
Vector Block

BACKGROUND GENERATOR
42 x 32 SCROLLABLE TILEMAP
LOWER SPRITE LAYER
UPPER SPRITE LAYER
80 x 30 CHARACTER MAP
80 x 8 TERMINAL WINDOW

I N P U T / O U T P U T

2 x **AUDIO CHANNELS**
(LEFT & RIGHT)
SQUARE WAVE
SAWTOOTH WAVE
TRIANGLE WAVE
SINE WAVE
WHITE NOISE

BUTTONS

LEDS

PSEUDO RANDOM NUMBER GENERATOR

SPI SDCARD

2 x **1hz TIMERS**
2 x **1khz TIMERS**

UART
115200 BAUD

Terminal Window

Character Map

Upper Sprites

Bitmap

Lower Sprites

Tilemap

Background

| **25MHZ SYSTEM CLOCK** |
| **50MHZ COPRO CLOCK** |
| **50MHZ MEMORY CLOCK** |
| **50MHZ I/O CLOCK** |
| **25MHZ VIDEO CLOCK** |
| **25MHZ GPU CLOCK** |