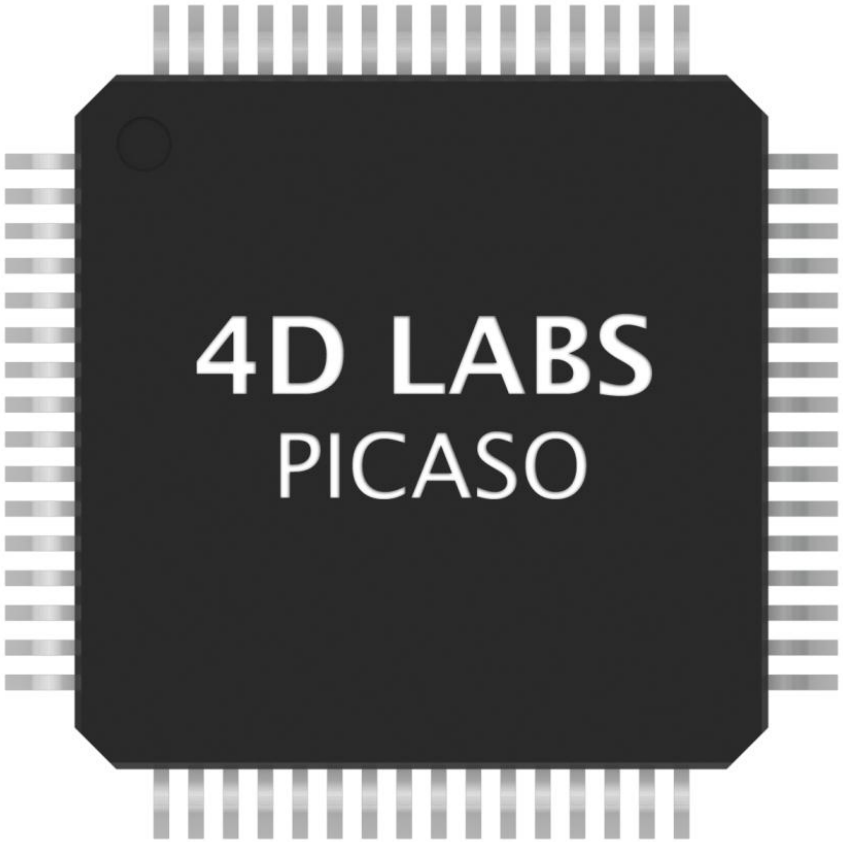
PICASO

Embedded Graphics Processor



4D SYSTEMS

MESSAGE FROM THE CEO

To our valued customers,

Thank you for your interest in 4D Systems and the products we have to offer.

We are constantly looking for ways to improve our customer experience and it is hoped that a Product Brief such as this, can instil confidence in choosing 4D Systems as your supplier of superior embedded electronic products.

We invite you to showcase our latest release and thank you again for your continued support.

Atilla Aknar
Founder & CEO

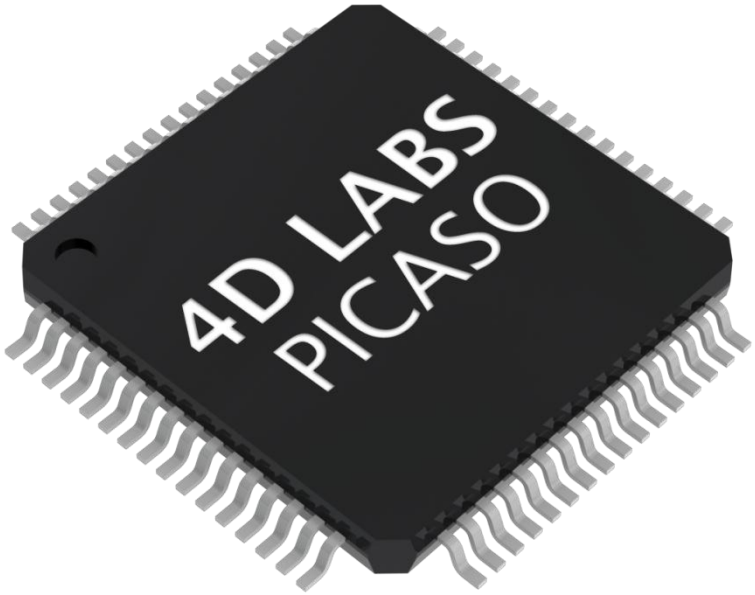
Table of Contents

1. Overview

The **PICASO** is a custom embedded graphics controller designed to interface with many popular OLED and LCD display panels. Powerful graphics, text, image, animation and countless more features are built right inside the chip. It offers a simple plug-n-play interface to many 16bit 80-Series colour LCD and OLED displays.

The internal architecture of the **PICASO** is constructed of high level functional blocks that are controlled and supervised by EVE (Extensible Virtual Engine).

The combined blocks of EVE, the built-in graphics and system functions and the low level drivers make up and define the personality of the PICASO Processor (analogy to that of a soft silicon). This is referred to as the Personality-module-micro-Code or PmmC (Firmware in general) for short.

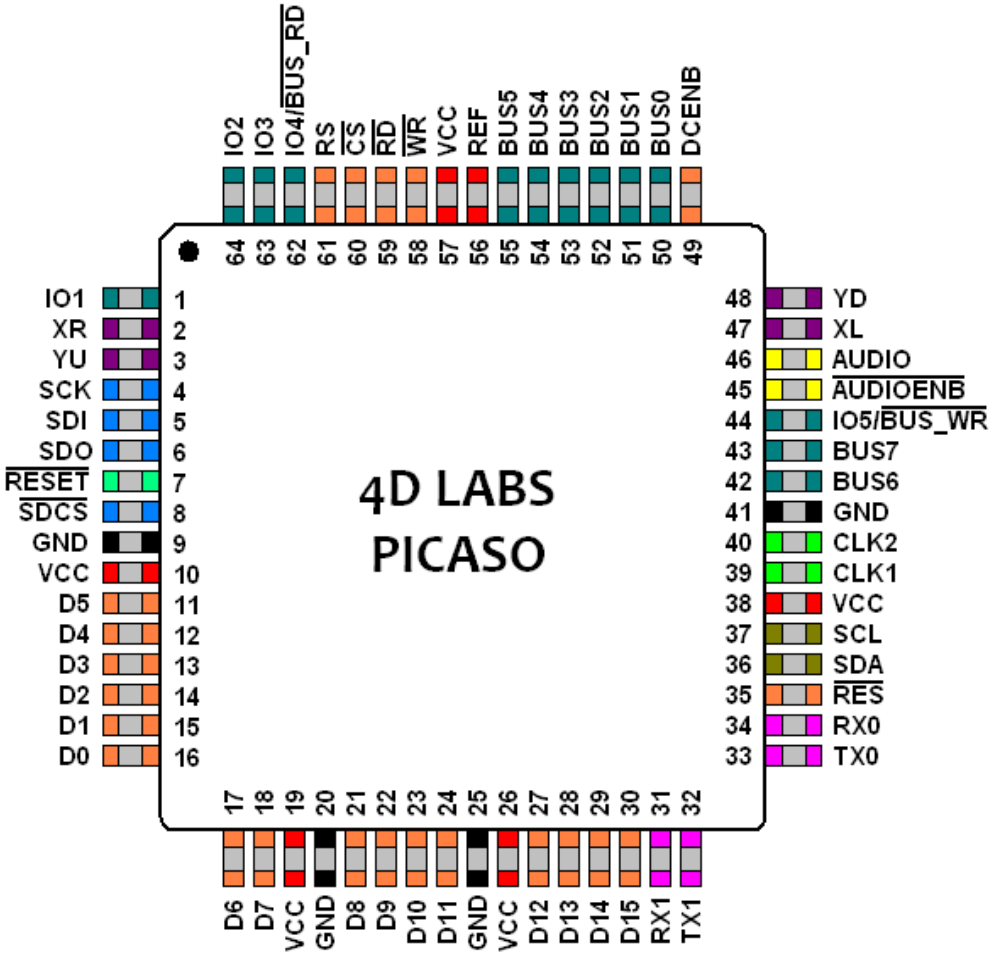


2. Pin Description

The **PICASO** chip provides 16bit data lines D0-D15, with RES, CS, RS and RD/WR signals to interact with the Display.

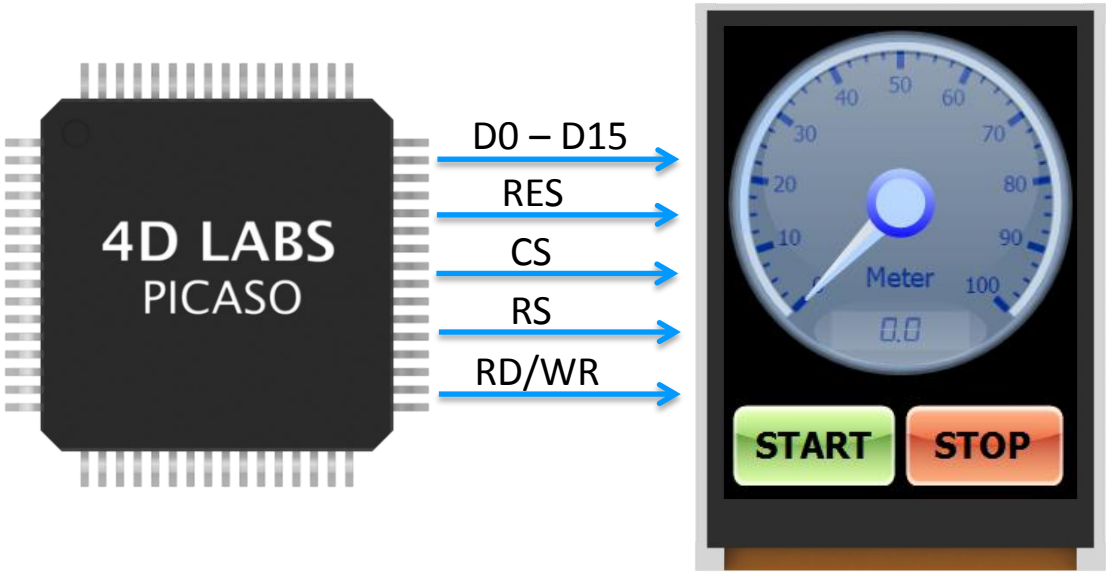
The **PICASO** Processor offers a set of comprehensive I/O features and can interface with SPI, I2C and serial devices. There are 13 multi purpose GPIO pins which are defined with a PmmC file. Each individual GPIO can be set as an INPUT or an OUTPUT, and the 8 bits (BUS0-BUS7) can be used as an 8-bit parallel General purpose I/O Bus.

Audio support is built into the **PICASO** processor, enabling audio to be easily integrated into a product. A simple instruction enables the user to execute audio files, which can occur simultaneously with the execution of other instructions.



3. Display Interface

The **PICASO** chip is designed to work with minimal design effort and all of the data and control signals are provided by the chip to interface directly to the display. Simply choose your display and interface it to the **PICASO** on your application board. This offers enormous advantage to the designer in development time and cost saving and takes away all of the burden of low level design.



4. PICASO Features

01 Supports 80-Series 16 bit wide CPU interface OLED/LCD displays

02 14KB FLASH Memory, 14KB RAM

03 EVE uses ~1/10th of the code-space compared to most other processor implementations

04 2 Asynchronous hardware serial ports

12 Dedicated SPI to communicate with the micro-SD Card

08 micro-SD/SDHC card support

09 DOS compatible file access (FAT16)

06 Dedicated 16-bit PWM audio output to play WAV files

07 4-Wire Resistive Touch panel interface

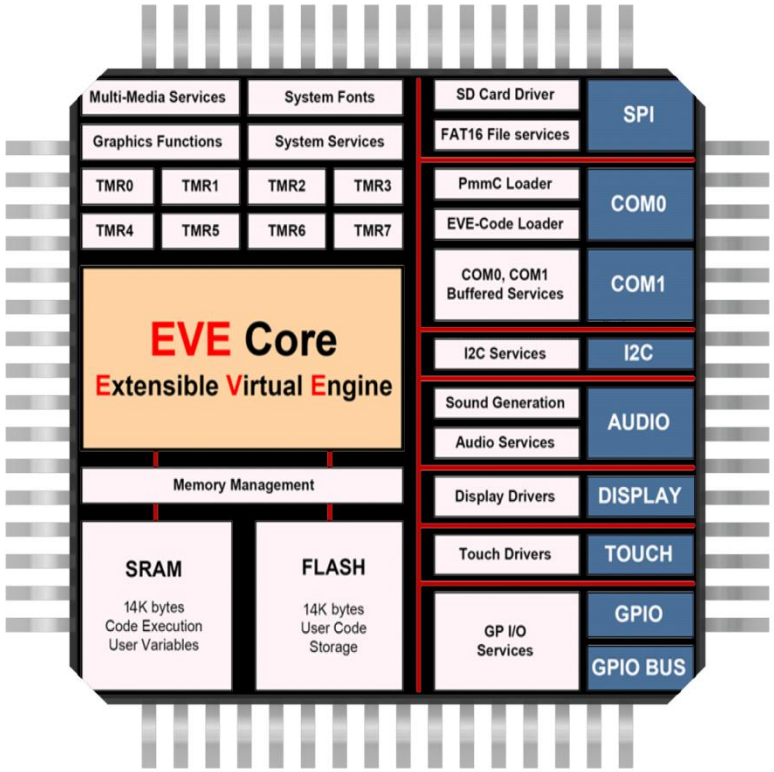
11 I^2C Communication Bus

13 13 General Purpose IO

14 8 of the GPIOs useable in a parallel bus configuration

15 8 x 16 bit timers with 1ms resolution

16 243 High Level Internal Functions

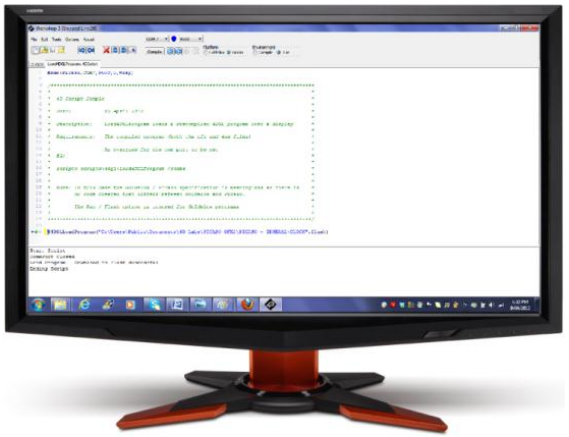


5. Getting Started

Getting started with a **PICASO** Display Module is as simple as connecting the 4D Programming Cable to the Display Module, and choosing your Product and Development Environment in the 4D Workshop4 IDE.

4D Workshop4 IDE guides you through the relevant Aid Tools with adequate explanation to get your Application up and running in no time.

4D Programming Cable



6. Development Environment

Workshop4 is a comprehensive software IDE tool suite that provides an integrated software development platform for all of the 4D family of processors and modules. The Workshop4 IDE supports three different **Development Environments** for the user, to cater for different requirements and skill level.

Designer: The Designer environment enables the user to write 4DGL code in its natural form to program the Display Module.

ViSi: A visual programming experience, suitably called ViSi, enables drag-and-drop type placement of objects to assist with 4DGL code generation and allows the user to visualise how the display will look while being developed.

ViSi-Genie: An advanced environment called ViSi-Genie doesn't require any 4DGL coding at all, it is all done automatically for you. Simply lay the display out with the objects you want, set the events to drive them and the code is written for you automatically. ViSi-Genie provides the latest rapid development experience from 4D Systems.

Serial: A Serial environment is also provided to transform the Display Module into a slave serial module, allowing the user to control the display from any host microcontroller or device with a serial port.

7. 4DGL Language

PICASO driven by **EVE**, is a proprietary, high performance virtual processor with an extensive byte-code instruction set, optimised to execute compiled 4DGL programs. **4DGL** (4D Graphics Language) was specifically developed from ground up for the EVE engine core. It is a high level language which is easy to learn and simple to understand, yet powerful enough to tackle many embedded graphics applications.

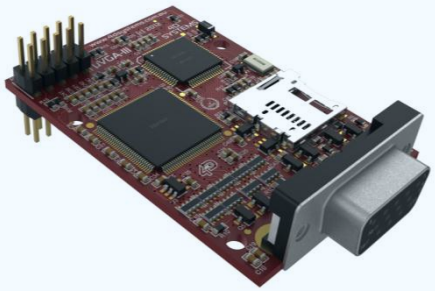
4DGL is a graphics oriented language allowing rapid application development. The syntax structure was designed using elements of popular languages such as C, Basic and Pascal. Programmers familiar with these languages will feel comfortable with 4DGL. It includes many familiar instructions such as IF..ELSE..ENDIF, WHILE..WEND, REPEAT..UNTIL, GOSUB..ENDSUB, GOTO, PRINT as well as some specialised instructions SERIN, SEROUT, GFX_LINE, GFX_CIRCLE and many more.

```
#platform "PICASO-GFX2“

var rad, color, counter;


func main()

   gfx_Cls();

   color := 0;
   gfx_Set(PEN_SIZE, OUTLINE);

   while(1)
      rad := 5;
      while(rad < 60)
         color := RAND();
         gfx_Circle(90, 74, rad, color);
         gfx_Rectangle(5, 5, rad, rad++, color^0xF00F);
         gfx_Line(90, 74, 20, rad, color^0x0FF0);
         rad := rad + 8;
         pause(20);
      wend
   wend
endfunc
```

8. Display Modules

4D Systems offers five different display modules in the microLCD range, and a VGA module in the microVGA range, driven by the PICASO Processor. Details on individual modules could be found from their Product Brief, Datasheet or from the 4D Systems website.

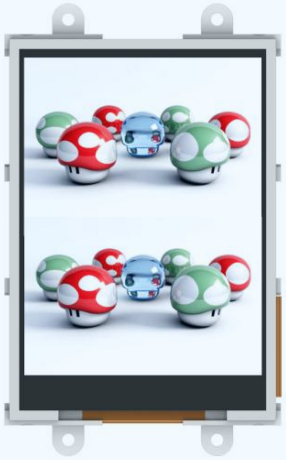
microVGA Range



microLCD Range

µLCD-24PTU

µLCD-28PTU



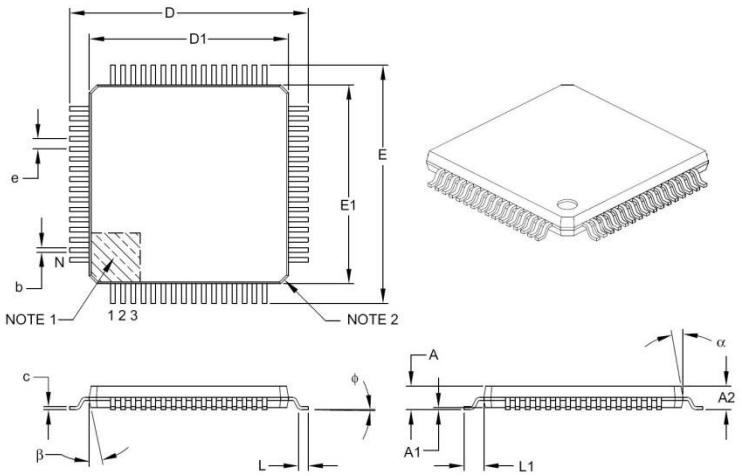
µLCD-32PTU

µLCD-32WPTU

µLCD-43P/PT/PCT

9. Mechanical Dimensions

64-Lead Plastic Thin Quad Flatpack (PT) – 10x10x1 mm Body, 2.00 mm [TQFP]



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Leads	N		64	
Lead Pitch	e		0.50 BSC	
Overall Height	A	–	–	1.20
Molded Package Thickness	A2	0.95	1.00	1.05
Standoff	A1	0.05	–	0.15
Foot Length	L	0.45	0.60	0.75
Footprint	L1		1.00 REF	
Foot Angle	ϕ	0°	3.5°	7°
Overall Width	E		12.00 BSC	
Overall Length	D		12.00 BSC	
Molded Package Width	E1		10.00 BSC	
Molded Package Length	D1		10.00 BSC	
Lead Thickness	c	0.09	–	0.20
Lead Width	b	0.17	0.22	0.27
Mold Draft Angle Top	α	11°	12°	13°
Mold Draft Angle Bottom	β	11°	12°	13°

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Chamfers at corners are optional; size may vary.
3. Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.
REF: Reference Dimension, usually without tolerance, for information purposes only.

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For additional information on PICASO Processor, please refer to the PICASO Datasheet or visit 4D Systems website at www.4dsystems.com.au

If you require specific help with a 4D Systems product, information can be sourced from the FAQ and relevant forum threads on the website, or by contacting a direct member of our Tech Support team at 4D Systems at support@4dsystems.com.au

For enquiries regarding sales, distributors, or business relations, please contact Sales at sales@4dsystems.com.au