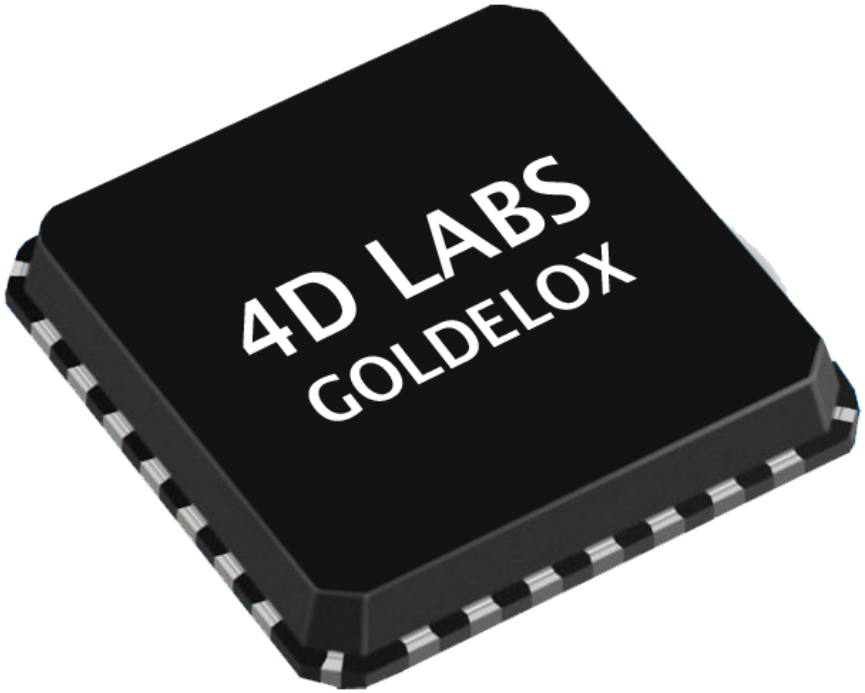
GOLDELOX

Embedded Graphics Processor



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

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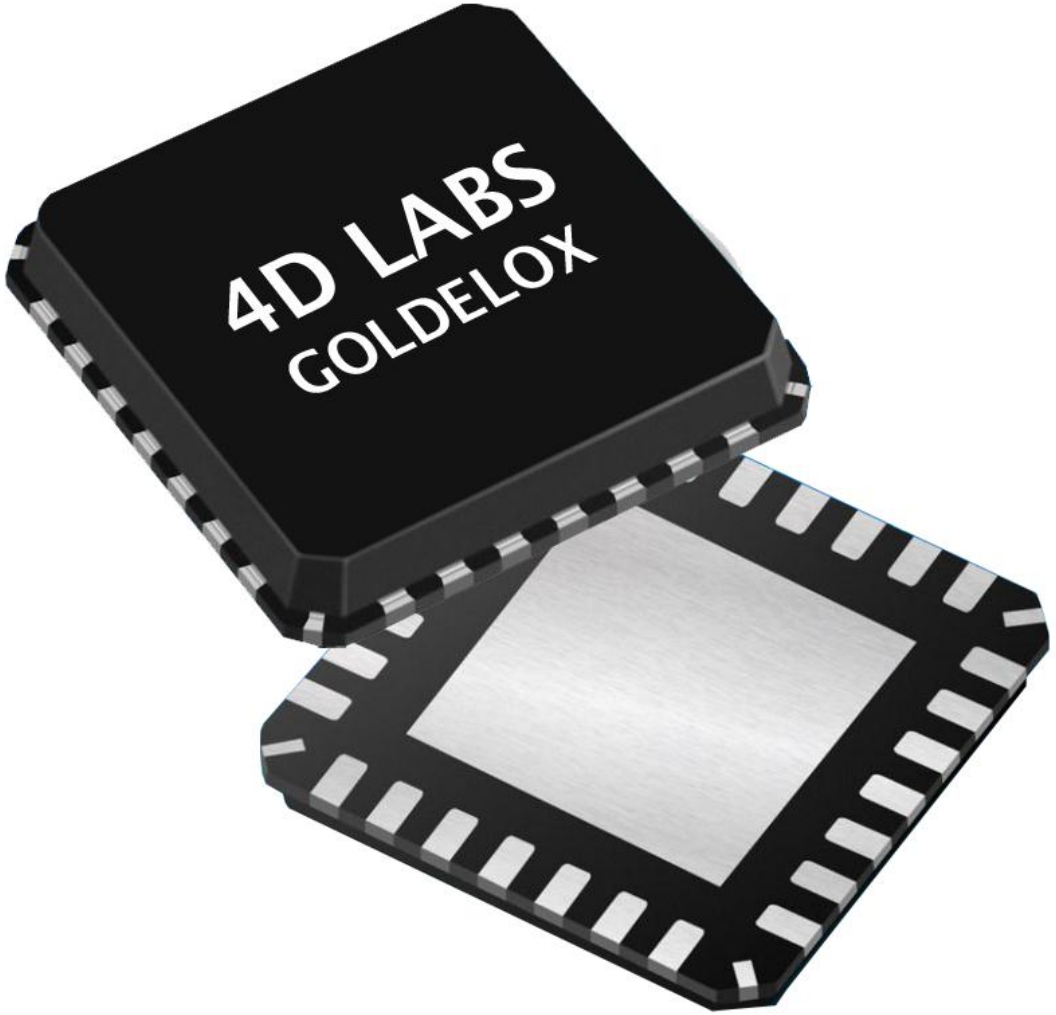
1. Overview

The **GOLDELOX** 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 8bit 80-Series colour LCD and OLED displays.

The internal architecture of the **GOLDELOX** 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 GOLDELOX 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.

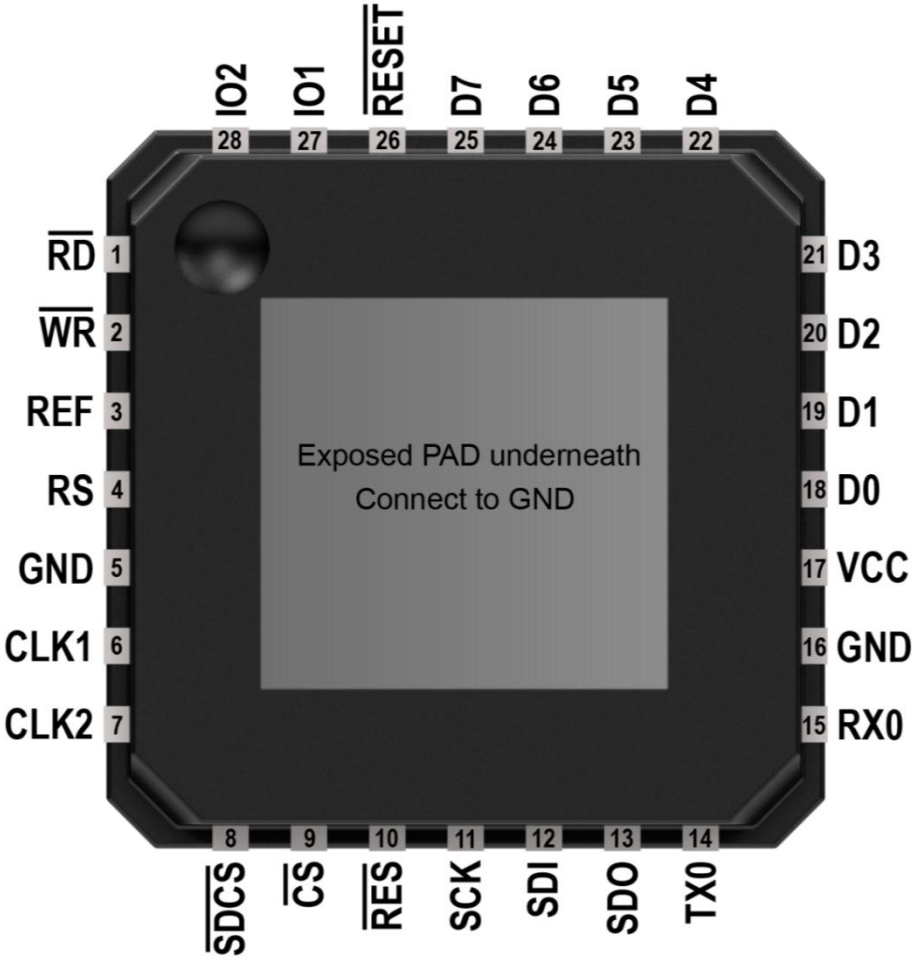


2. Pin Description

The **GOLDELOX** chip provides 8bit data lines D0-D7, with RES, CS, RS and RD/WR signals to interact with the Display.

The GOLDELOX Processor offers modest but comprehensive I/O features and can interface to SPI and serial devices etc. IO1 and IO2 are multi purpose GPIO pins which can interface with analogue, digital, buttons, joystick and Dallas 1-wire devices.

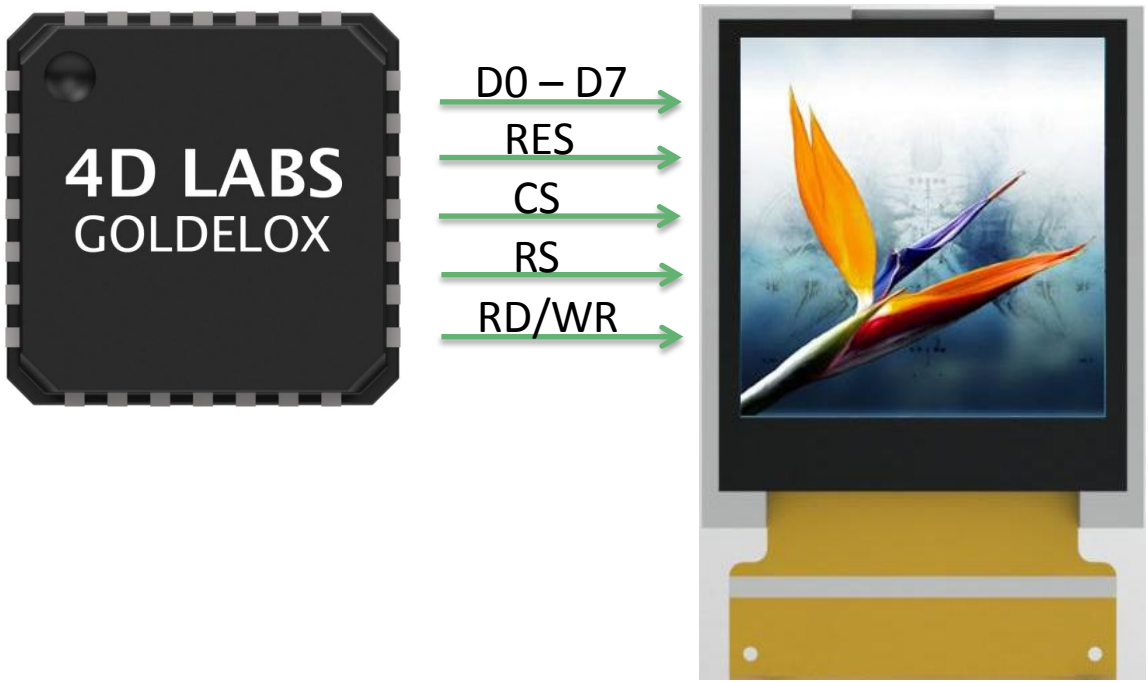
Provision is also made for creating complex sound effects for audible user feedback with an extended RTTTL tone generator.



3. Display Interface

The **GOLDELOX** 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 GOLDELOX 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.

The PmmC/Firmware file is also set to execute the Display Initialization routines internally. Hence each display requires a dedicated PmmC/Firmware file to be loaded to the GOLDELOX processor.



4. GOLDELOX Features

01 Supports 80-Series 8 bit wide CPU interface OLED/LCD displays

02 10KB FLASH Memory, 510Bytes RAM

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

04 1 x Asynchronous hardware serial port

05 Dedicated SPI to communicate with the micro-SD Card

06 micro-SD/SDHC card support

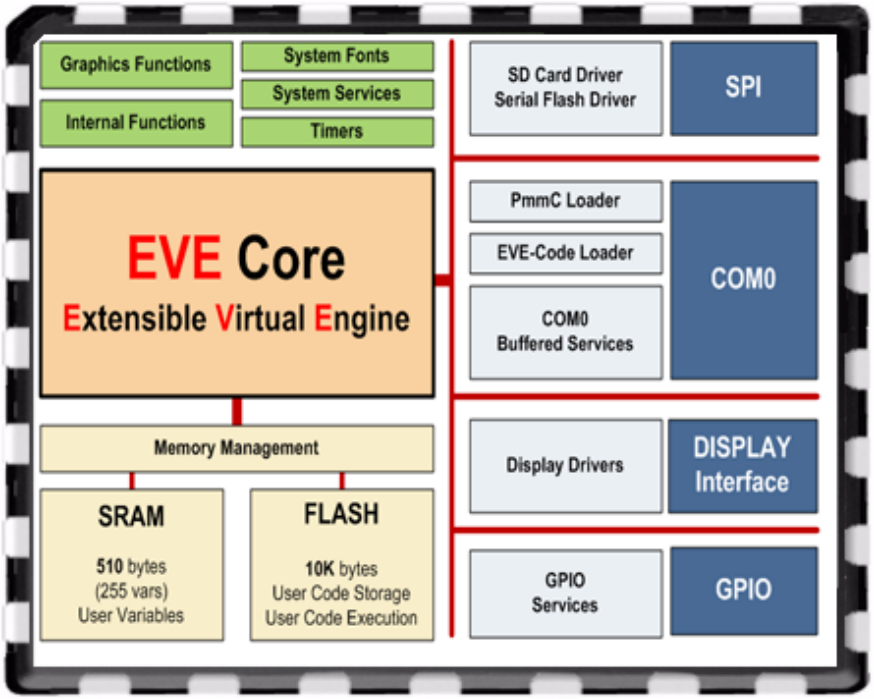
07 2 x GPIOs

Function	IO1	IO2
Digital Input	Yes	Yes
Digital Output	Yes	Yes
A/D Conversion 8/10 bits	Yes	No
Dallas 1-Wire Support	Yes	Yes
Sound Generation, RTTL Tunes	Yes	Yes
Joystick – 5 Position Multiswitch	Yes	No

08 1 x 32 bit free running System timer with 1ms resolution

09 4 x 16 bit timers with 1ms resolution

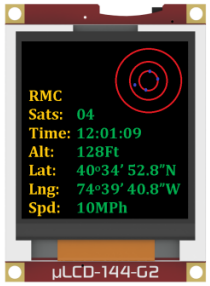
10 128 High Level Internal Functions



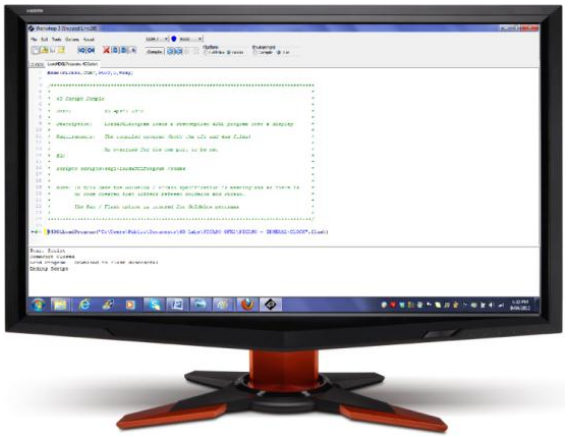
5. Getting Started

Getting started with a GOLDELOX 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.

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

GOLDELOX 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.

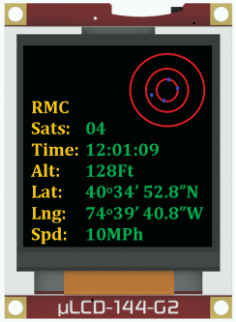
4DGL is a graphics oriented language allowing rapid application development. The syntax structure was designed using elements of popular languages such as C, Basic and Pascal. Programmers familiar with these languages will feel comfortable with 4DGL. It includes many familiar instructions such as IF..ELSE..ENDIF,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

```
#platform "GOLDELOX-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 four different display modules, spread across microOLED and microLCD range, driven by the GOLDELOX Processor. Details on individual modules could be found from the Product Brief, Datasheet or 4D Systems website.

microLCD Range



µLCD-144-G2

microOLED Range

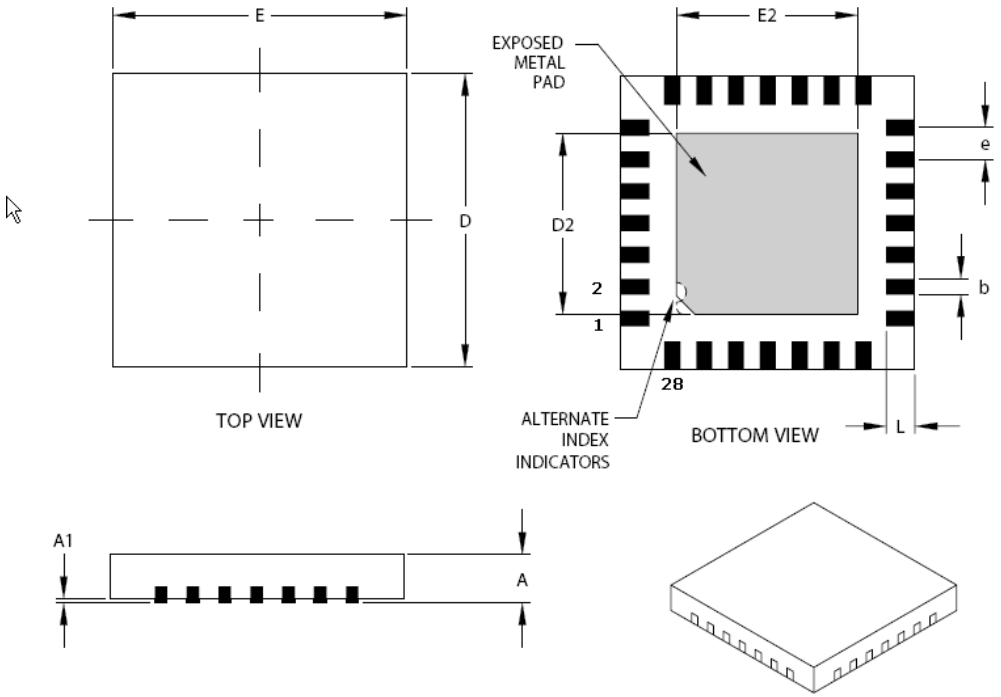
µOLED-96-G2

µOLED-128-G2

µOLED-160-G2

9. Mechanical Dimensions

28 Pin QFN28 JEDEC MO-220



Units		INCHES			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Pitch	e		.026 BSC			0.65 BSC	
Overall Height	A	.031	.035	.039	0.80	0.90	1.00
Standoff	A1	.000	.001	.002	0.00	0.02	0.05
Contact Thickness	A3		.008 REF			0.20 REF	
Overall Width	E	.232	.236	.240	5.90	6.00	6.10
Exposed Pad Width	E2	.140	.146	.152	3.55	3.70	3.85
Overall Length	D	.232	.236	.240	5.90	6.00	6.10
Exposed Pad Length	D2	.140	.146	.152	3.55	3.70	3.85
Contact Width	b	.009	.011	.013	0.23	0.28	0.33
Contact Length	L	.018	.022	.024	0.45	0.55	0.65

Proprietary Information

Disclaimer of Warranties & Limitation of Liability

For additional information on GOLDELOX Processor, please refer to the GOLDELOX 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