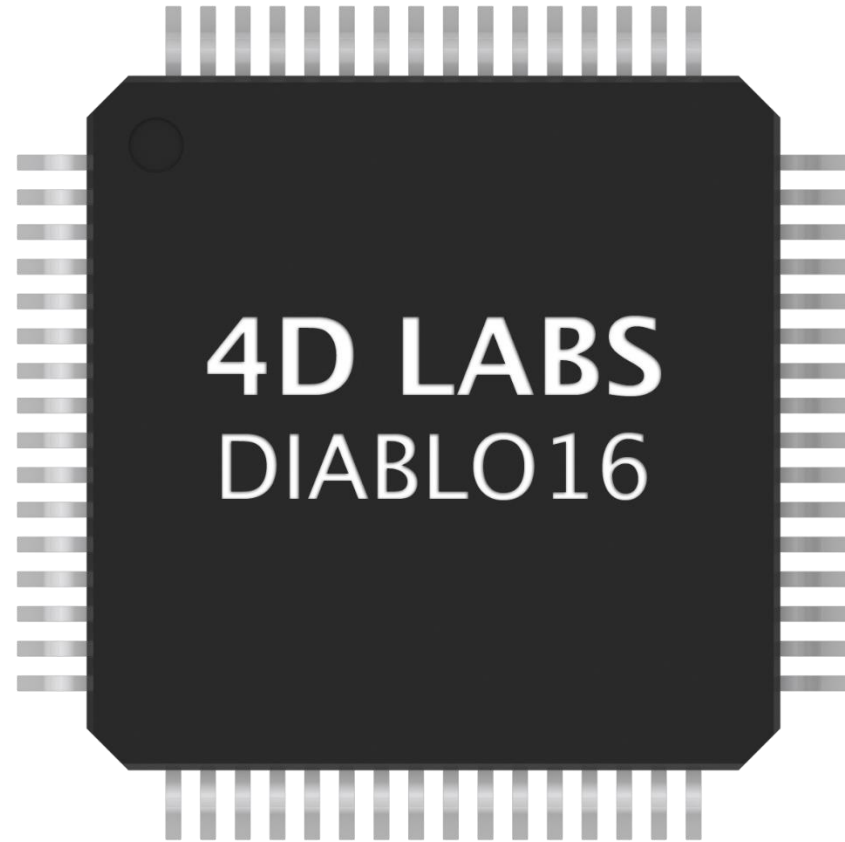


## DIABLO16

Embedded Graphics Processor



**4D SYSTEMS**

# MESSAGE FROM THE CEO

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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.

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Atilla Aknar  
Founder & CEO

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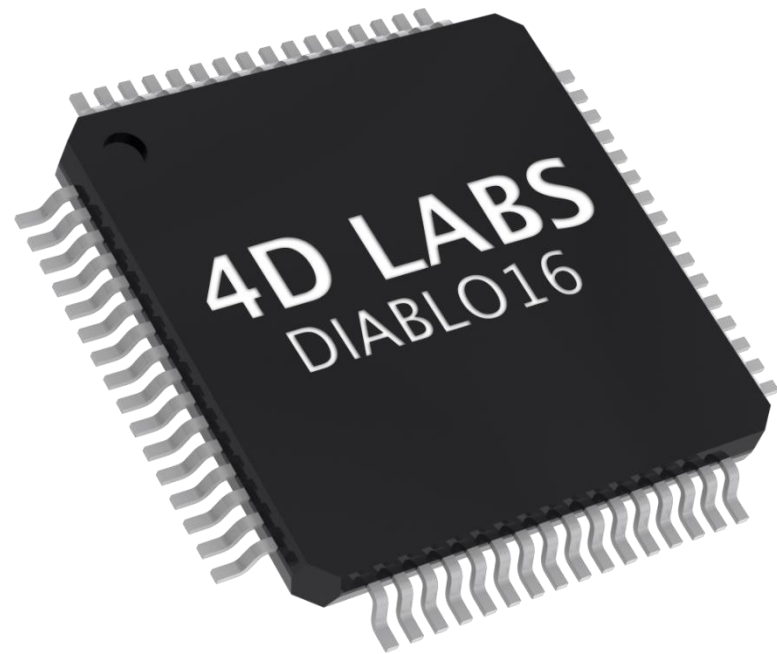
# 1. Overview

The **DIABLO16** Processor is a custom embedded 4DGL graphics controller designed to interface with many popular OLED and LCD display panels.

With its powerful graphics, text, image, and animation abilities built-in, along with numerous more features makes the **DIABLO16** a single chip solution for a wide variety of LCD and OLED display solutions.

The **DIABLO16** offers a simple plug-n-play interface to many 16-bit 80-Series colour LCD and OLED displays, and is designed to work with minimal design effort as all of the data and control signals are provided by the chip to interface directly to the display.

This offers enormous advantage to the designer in development time and cost saving and takes away all of the burden of low level design.

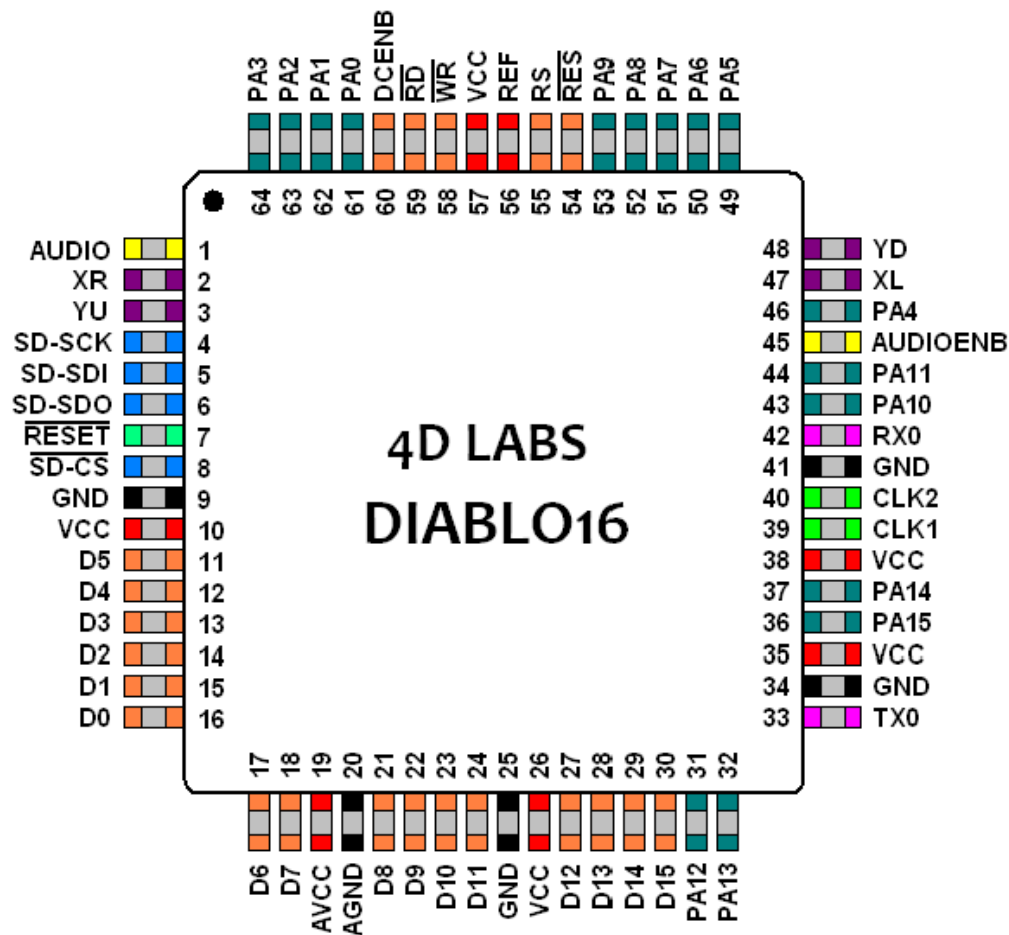


## 2. Pin Description

The **DIABLO16** chip provides 16bit data lines D0-D15, with RES, CS, RS and RD/WR signals to interact with the Display.

The **DIABLO16** processor offers a comprehensive set of I/O features and can interface to SPI, I2C, serial, digital, and analog devices, and provides a wealth of features such as PWM, Quadrature, PulseOut and Pin Counter functions. Provision is also made for a dedicated PWM audio output that supports audio WAV files and complex sound generation.

With its specially designed 4DGL high-level graphics language, and its highly optimised soft core virtual engine called EVE, development of graphics applications has never been easier.

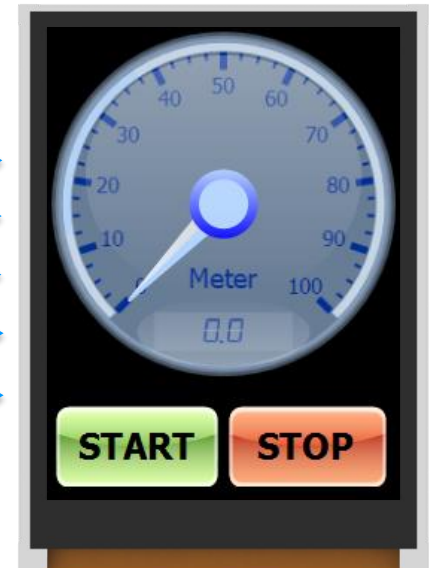
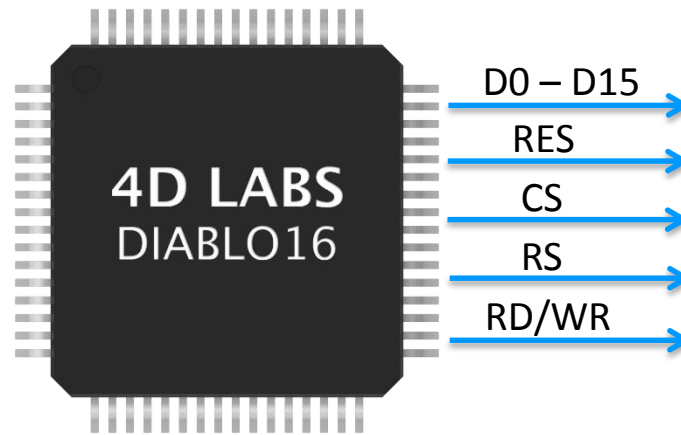


# 3. Display Interface

The **DIABLO16** makes light work for connecting up 16bit displays, due to it being designed specifically for display interface and graphics.

The **DIABLO16** 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 **DIABLO16** on your application board. This offers enormous advantage to the designer at development time, saving time and money, and takes away all of the burden of low level design.



# 4. DIABLO16 Features

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

02 6 banks of 32KB FLASH Memory, 32KB User RAM + 12KB System RAM

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

04 Up to 4 Asynchronous hardware serial ports

05 Up to 4 SPI Channels with 1 dedicated to Memory Card

06 Up to 3 I<sup>2</sup>C Channels

07 micro-SD/SDHC card support

08 DOS compatible file access (FAT16)

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

10 4-Wire Resistive Touch panel interface

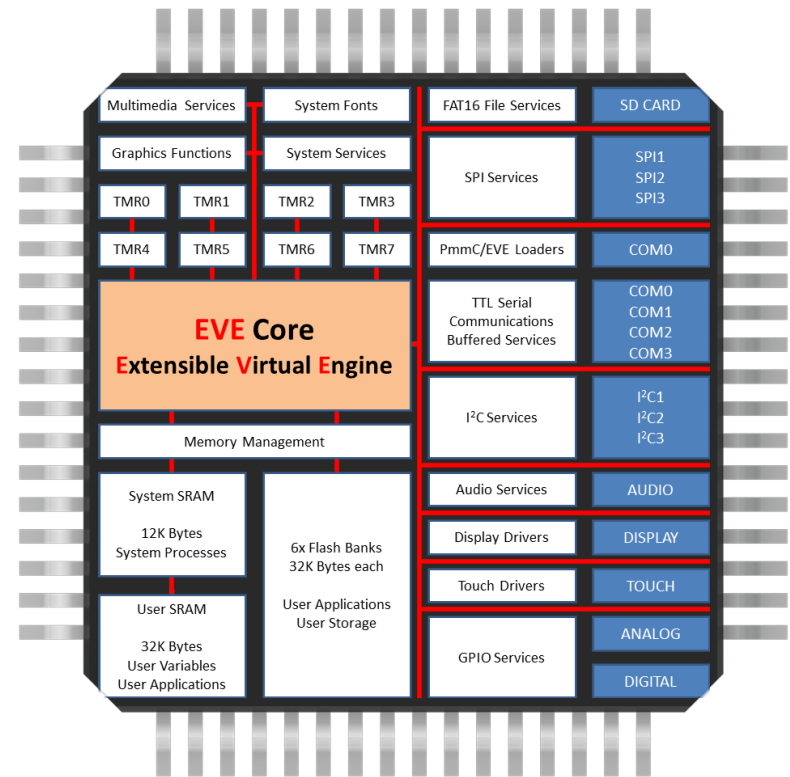
11 16 General Purpose I/O including 4 12-bit Analog Inputs

12 PWM (Simple and Servo) along with Quadrature Input

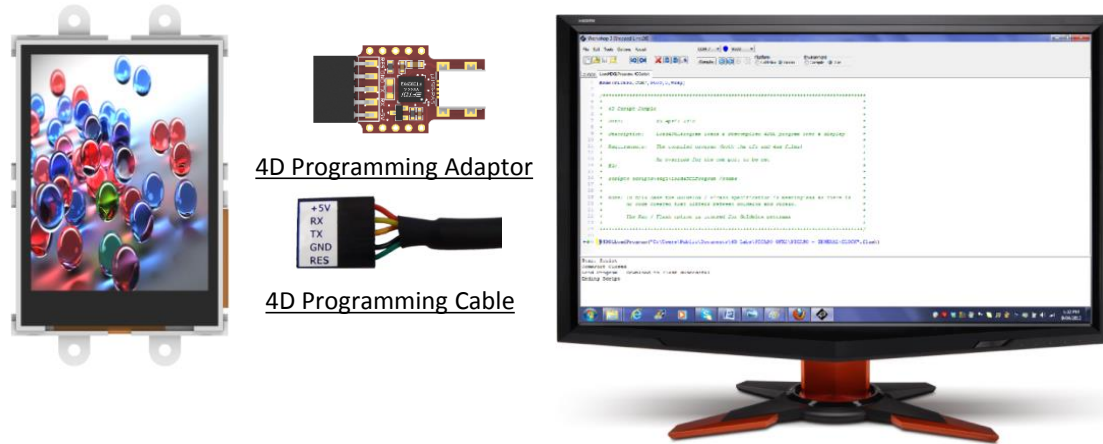
13 Pin Counters, Pulse Out and Parallel BUS support

14 8 x 16 bit timers with 1ms resolution

15 450+ High Level Internal Functions



# 5. Getting Started



Getting started with a **DIABLO16** Display Module is as simple as connecting the 4D Programming Cable or adaptor 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.





# 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 using a DIABLO16, 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.

# 7. 4DGL Language

**DIABLO16** 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 "uLCD-32DT"

#inherit "4DGL_16bitColours.fnc"

func main()

    gfx_ScreenMode(PORTRAIT) ; // Orientation

    print("Hello World") ;    // Simple Print Statement

    var rad, colour;

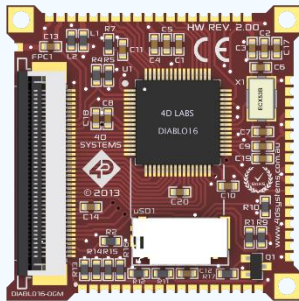
    repeat                    // Main Loop
        rad := 5;
        while(rad < 60)
            colour := RAND();
            gfx_Circle(90, 74, rad, colour);
            gfx_Rectangle(5, 5, rad, rad++, BLUE);
            gfx_Line(90, 74, 20, rad, RED);
            rad := rad + 8;
            pause(20);
        wend
    forever                    // End of Main Loop

endfunc
```

# 8. Display Modules

4D Systems offers a growing range of display modules in the microLCD range, driven by the **DIABLO16** Processor. Details on individual modules could be found from their Product Brief, Datasheet or from the 4D Systems website.

## microLCD Range



DIABLO16-OGM

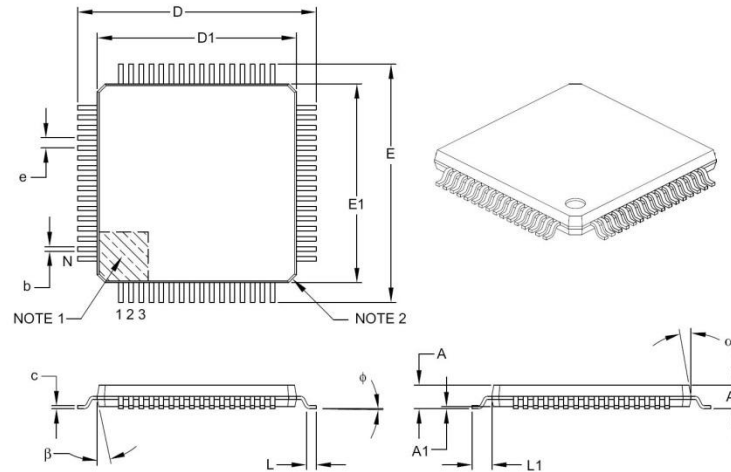
(Available only via RFQ with MOQ)



μLCD-70DT

# 9. Mechanical Dimensions

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



Dimension	Units	MILLIMETERS		
		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:**

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Chamfers at corners are optional; size may vary.
- Dimensions D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25 mm per side.
- 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 DIABLO16 Processor, please refer to the DIABLO16 Datasheet or visit 4D Systems website at [www.4dsystems.com.au](http://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](mailto:support@4dsystems.com.au)

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