Innovative and Resourceful

32-bit MCU Graphics Solutions

Creating professional-looking graphical user interfaces (GUI) on memory and cost efficient microcontrollers (MCU) has never been easier than with the MPLAB Harmony Graphics Composer (MHGC) tools suite and libraries. This tightly-integrated system of GUI-based tools and software were built by the leader in high-performance 32-bit graphics MCU's, so there is less time and cost required in bug fixing and re-integration of code from outside tool sets and libraries. MHGC is "what you see is what you get", or WYSIWYG, based GUI development system with loads of features that are both unique in the industry and completely free.

No other graphics microcontroller provider gives you so much value for you GUI design needs:

- **Tightly Integrated Tools Environment -** Tight integration between MHGC, MPLAB X, and MPLAB Harmony produces an enhanced, interactive development environment where design and debug can be focused on application-specific code, leading to shorter time-to-market, lower overall development costs, and higher quality products.
- **Performance -** MHGC was designed from the ground up to enable code portability across multiple 32-bit families while also making maximum use of available graphics processing units (GPU), multi-layer overlay graphics controllers, and DRAM available on Microchip's high-performance 32-bit MCUs.
- **Cost -** MHGC is free to design with and free to use with Microchip's 32-bit MCUs. It's also royalty free. All components of MHGC are available in each public release of MPLAB Harmony, Microchips framework for 32-bit MCU development, and works with the free version of MPLAB XC32 compiler.

MPLAB® Harmony Graphics Library

The MPLAB Harmony Graphics Library is a free, modular library optimized for Microchip 32-bit microcontrollers. The library includes features such as alpha blending, gradient fills and anti-aliased fonts. Applications can take advantage of these features to enhance the user experience while delivering performance required by the application. The Graphics Library features:

- Up to 24-bit or 16.7M Colors
- Parent-child tree system allows for modular assembly of advanced GUI design
- Modern input widgets which include graphing widgets, radial menu (3D), arc widgets (drawing, slider, gauges), list wheel
- Run-length encoding image compression and basic procedural motion
- Capacitive and resistive touch screen, keypad
- World-class multi-lingual localization system
- Extensive support available for external display controllers

MHGC Tools

Screen Designer	WYSIWYG display drawing screen which accurately reflects assets relative to the size of the display used.
Display Manager	Industry exclusive customized driver generator enable rapid support for non-standard display sizes, resolutions, orientations, and timings.
Event Manager	Tool that manages and maintains all interactions between widgets, screens and inputs, providing easy access to edit and create events and actions.
Image Asset Manager	Pictures and other graphics assets are managed by this tool, which enables the designer to apply edits to assets like crop, clip and compress as well as modify color space, encoding, and memory destination options.
Font and String Asset Manager	Enables the use of strings in multiple languages for accelerated localization as well as automatic glyph filtering to reduce memory usage. It also enables the import/export of whole string tables to support non-technical translation specialists.
Resource Allocation and Memory Management	Provides detailed reports on asset allocation, which is useful for optimizing flash resources, and memory usage, including compression, color, and feature settings.
Heap Usage Calculator	As a significant development time saver, this tool provides an accurate estimate of heap consumption based on assets and screen design.

PIC32MZ DA with Integrated Graphics Controller and Graphics Processor

The PIC32MZ “DA” series, with its integrated graphics controller, graphics processor and available on-chip 32 MB of DDR2 DRAM, lifts Graphical User Interface (GUI) designs to performance and quality levels not yet seen in embedded microcontroller applications. The PIC32MZ DA series provides microprocessor-like graphics quality with the ease of design of an MCU. Additionally, with MPLAB Harmony Graphics 2.0, you can finish and display your GUI design faster than you’d ever thought possible.

- 3-Layer Graphics Controller capable of driving 24-bit color WVGA
- High-performance 2D Graphics Processing Unit (GPU)
- 32 MB integrated DDR2 DRAM or 128 MB externally addressable
- Up to 2 MB Flash and 640 KB RAM
- 12-bit ADC Throughput at 18 Msps
- Full-featured hardware crypto engine with Random Number Generator (RNG) for data encryption/decryption and authentication

Low-Cost Controllerless Graphics (LCCG)

Microchip’s PIC32 microcontrollers offer up to 2 MB Flash, up to 512 KB RAM, up to 330 DMIPS and high-performance DMA to render graphics directly to displays. All of Microchip’s PIC32 MCUs include a Parallel Master Port (PMP) which is used to connect external SRAM and LCD. This enables PIC32 devices to drive a display without an external graphics controller.

- Uses <5 MIPS and DMA to render graphics
- Direct interface to STN, TFT displays
- Integrated up to 512 KB RAM for frame buffering

Multimedia Expansion Board II (MEB II)

Multimedia Expansion Board II (DM320005-5)

The Multimedia Expansion Board II (MEB II) is a highly integrated, compact and flexible development platform which works with PIC32MZ Starter Kit. The MEB II kit features a 4.3" WQVGA PCAP touch display daughter board. The kit also has an on-board 24-bit stereo audio codec, VGA camera, 802.11 b/g wireless module, Bluetooth® HCI transceiver, temperature sensor, microSD™ slot and analog accelerometer.

Suggested Development Tool Kits	Part Number
Multimedia Expansion Board II	DM320005-5
PIC32MZ with FPU Embedded Connectivity Starter Kit	DM320007, DM320007-C
PIC32MZ Integrated Graphics with External DRAM (DA) Starter Kits	DM320008, DM320008-C
PIC32MZ Integrated Graphics with Stacked DRAM (DA) Starter Kits	DM320010, DM320010-C
LCCG PICtail™ Plus Board	AC164144
WQVGA LCD or VGA LCD*	AC164127-6, AC164127-8
PIC32MZ Embedded Connectivity Adaptor Board	AC320006
High-Performance WVGA LCD Display with MaxTouch	AC320005-5

*Can only be driven by DM320007/7-C for an LCCG setup

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