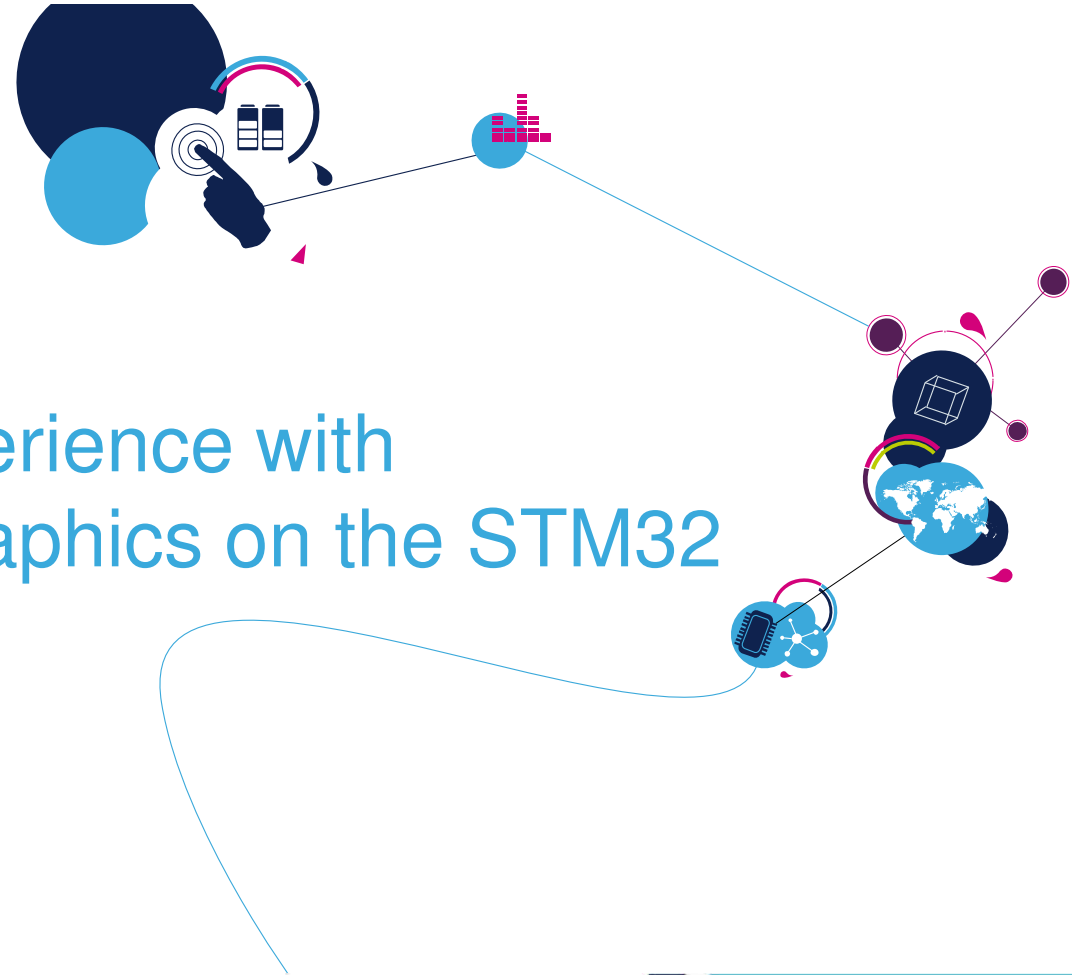




TouchGFX



Enhancing the User Experience with TouchGFX Advanced Graphics on the STM32

Mike Hartmann
Product Marketing



Technology Tour 2019

Vancouver, BC | September 24





Accelerating the *HMI of Things*



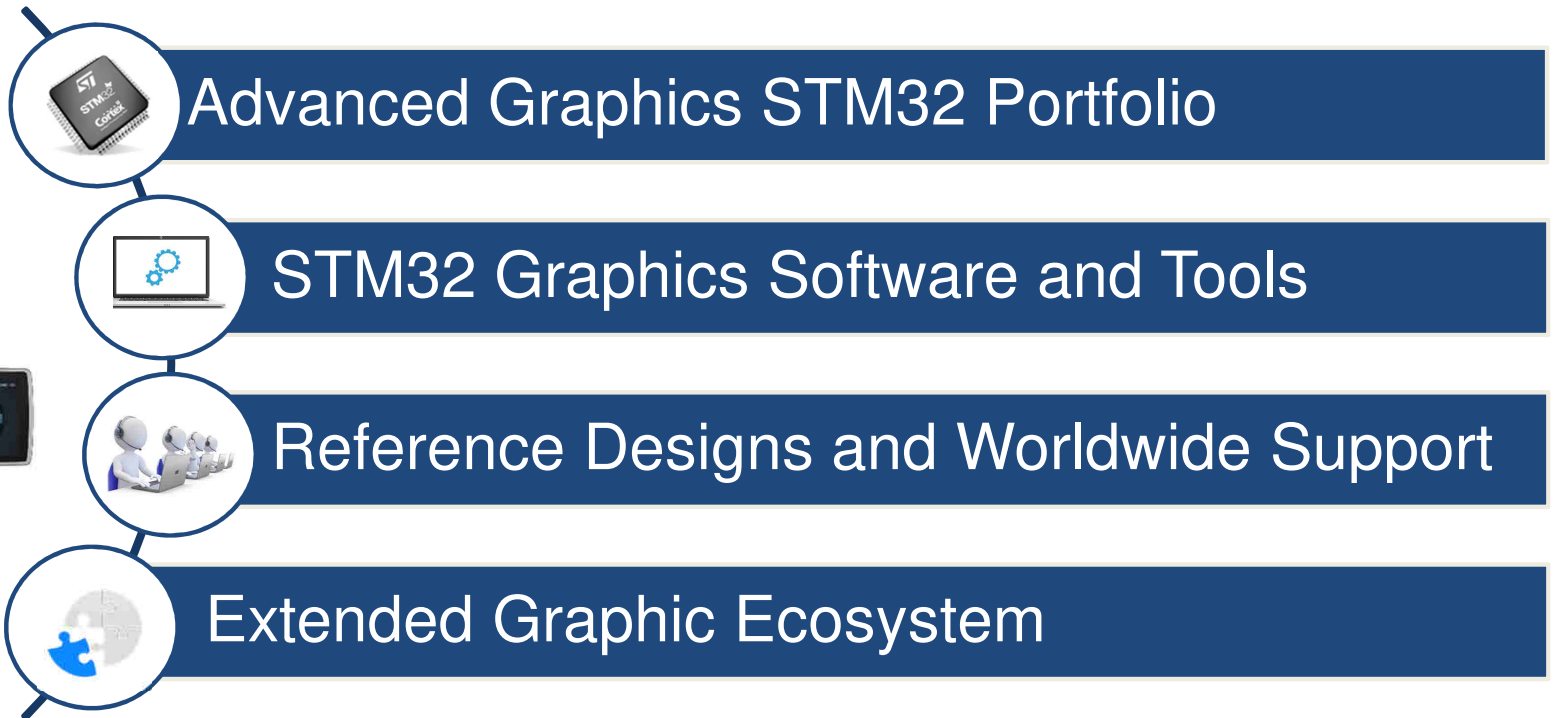
Enabling high-end user experience in embedded devices
Smarter and richer devices requiring Advanced Graphic User Interfaces

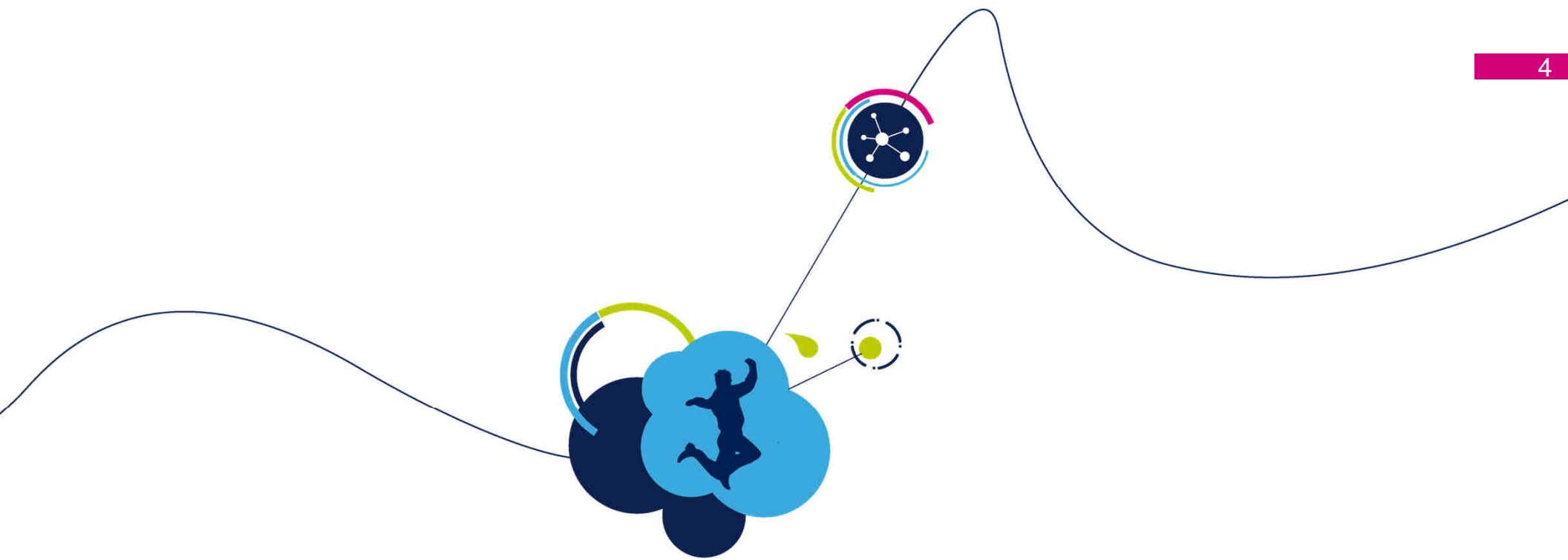




STM32 Graphics Offering

Enabling Enhanced User Experience in Embedded Devices



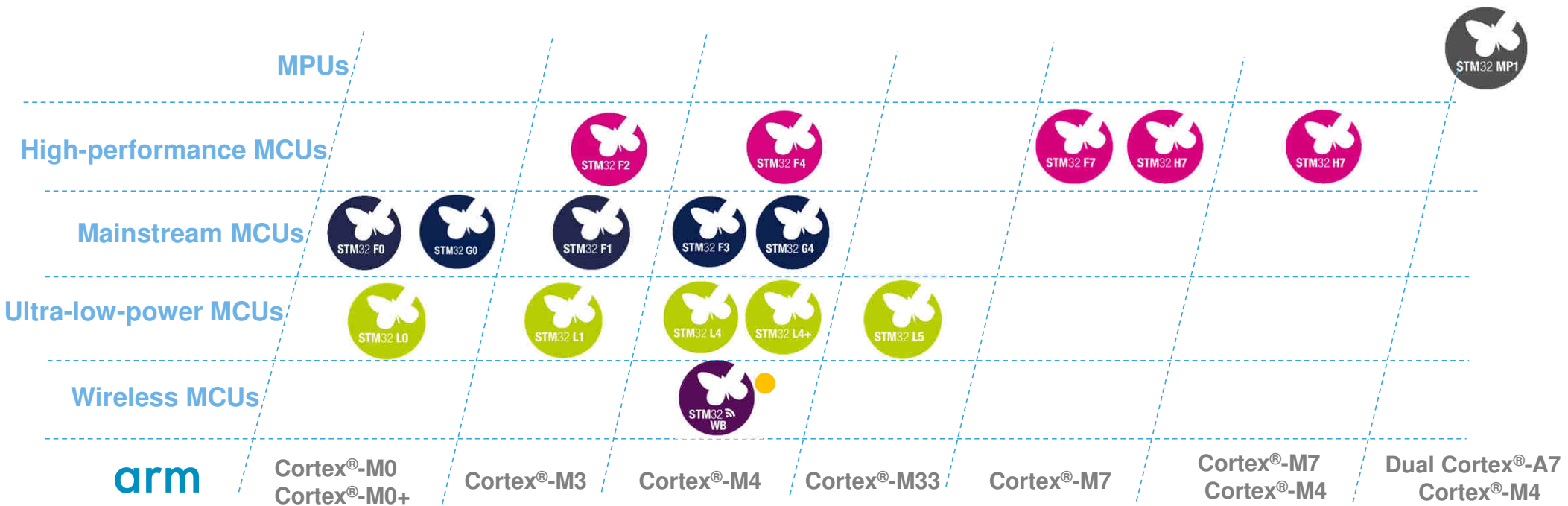


Advanced Graphics STM32 Portfolio

STM32 Portfolio

5

15 Product Series / More than 50 Product Lines

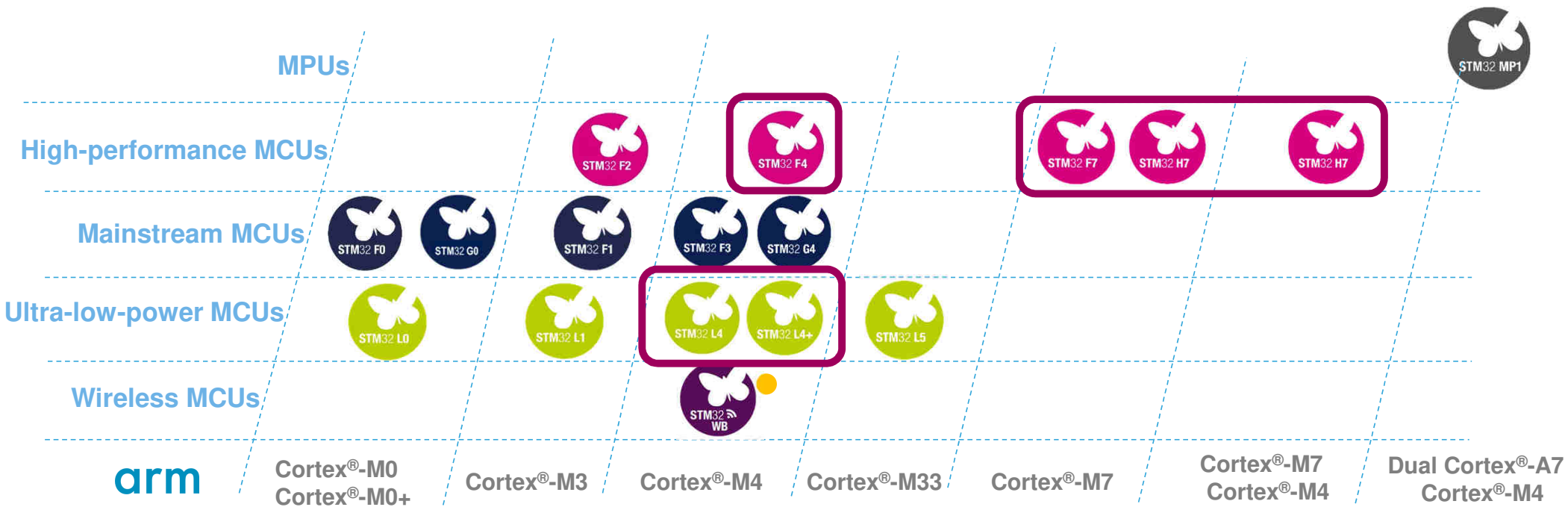


arm



STM32 Portfolio

15 Product Series / More than 50 Product Lines



arm



STM32 Graphics Feature Matrix

7

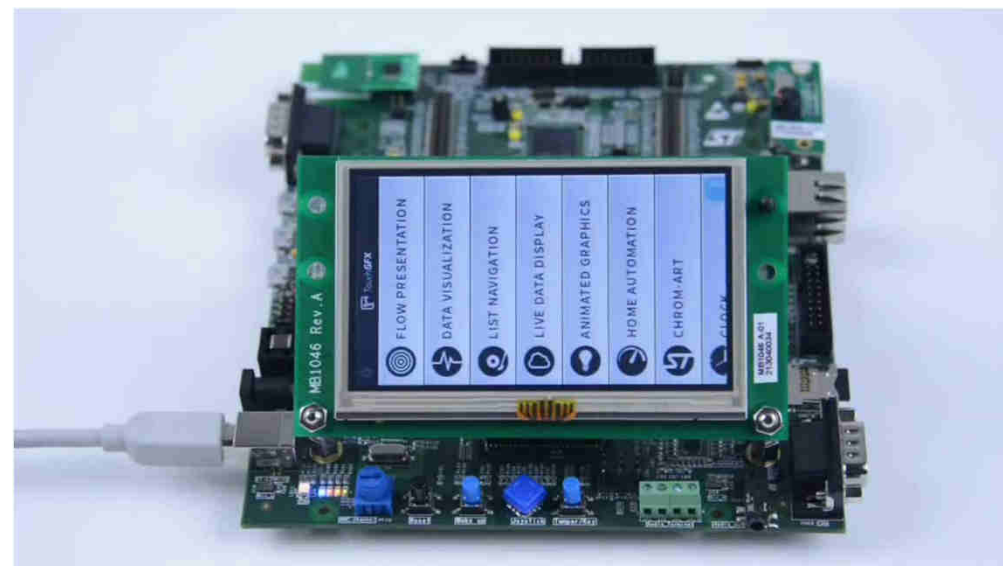
Device	Core	Flash	RAM	Display Controller	Chrom-ART	Other Optimization
STM32H7x7	M7 @ 480MHz M4 @ 240MHz	1MB to 2MB	1MB	TFT, DSI	✓	JPEG
STM32H7x5	M7 @ 480MHz M4 @ 240MHz	1MB to 2MB	1MB	TFT	✓	JPEG
STM32H7x3	M7 @ 480MHz	1MB to 2MB	1MB	TFT	✓	JPEG
STM32H750	M7 @ 480MHz	128KB	1MB	TFT	✓	JPEG
STM32F7 Advanced	M7 @ 216MHz	1MB to 2MB	320KB to 512KB	TFT*, DSI*	✓	JPEG*
STM32F750	M7 @ 216MHz	64KB	320KB	TFT	✓	
STM32F469	M4 @ 180MHz	512KB to 2MB	384KB	TFT, DSI	✓	
STM32F429	M4 @ 180MHz	512KB to 2MB	256KB	TFT	✓	
STM32F427	M4 @ 180MHz	1MB to 2MB	256KB		✓	
STM32L4+	M4 @ 120MHz	1MB to 2MB	640KB	TFT*, DSI*	✓	Chrom-GRC*
STM32L496	M4 @ 80MHz	512KB to 1MB	320KB		✓	



STM32 Chrom-ART™ Accelerator

Efficient 2D graphic acceleration for high-end transitions and effects

- DMA2D – 2D Image Copy
 - Mem-to-mem DMA transfer with programmable rectangle area
- Alpha Blender
 - per-object alpha
 - per-pixel alpha
- Pixel Format convertor
 - **Input/output:** ARGB8888 / RGB888 / RGB565 / ARGB1555 / ARGB4444
 - **Input-only:** A4 /A8 alpha bitmap for glyphs, L8 for 256 colors CLUT



2-10% CPU load with Chrom-ART™
80-100% without

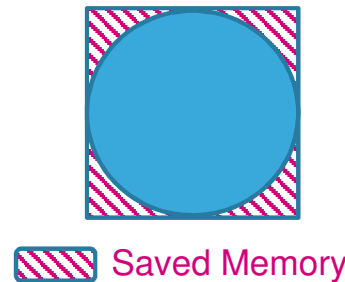


STM32 Chrom-GRC™

Chrom-GRC™ for Memory Optimization

Chrom-GRC™

- Graphic Resource Cutter for non-square displays
 - No modification or special management at SW level
- ➔ **Saving up to 20% of RAM footprint for framebuffer**



- **For 360x360 round display**
 - @16bpp ~205kBytes (vs.253kBytes)
 - @24bpp ~307kBytes (vs.380kBytes)
- **For 400x400 round display**
 - @16bpp: 250kBytes (vs.312kBytes)
 - @24bpp: 372kBytes (vs.469kBytes)

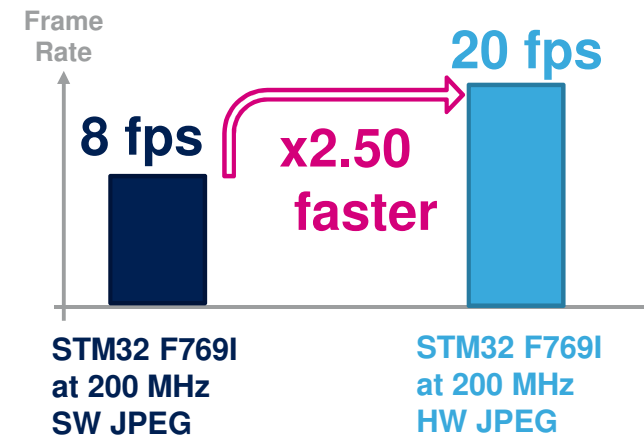
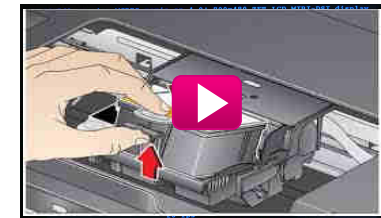


STM32 JPEG Codec

MJPEG video acceleration for branding and tutorial videos

HW JPEG accelerator

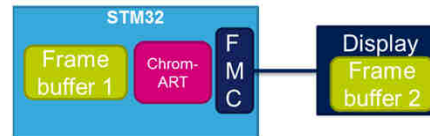
- Fast and simple hardware JPEG compression and decompression
- Full management of JPEG headers
- Supporting motion JPEG videos
 - Saving CPU load for MJPEG management
 - Enhancing branding and user experience
 - Branding animations at startup
 - End-product embedded tutorials





STM32 Display Interfaces

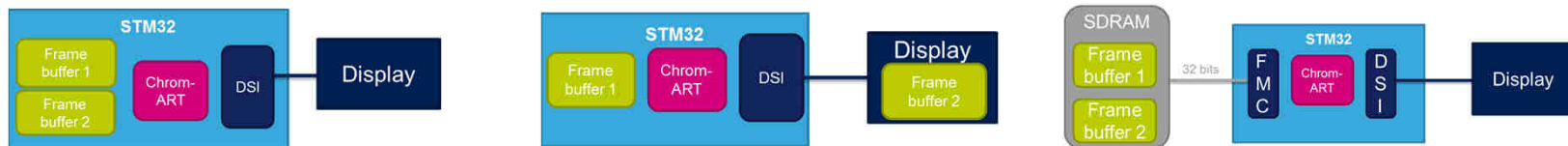
- Intel 8080 and Motorola 6800 LCD interfaces for small resolutions

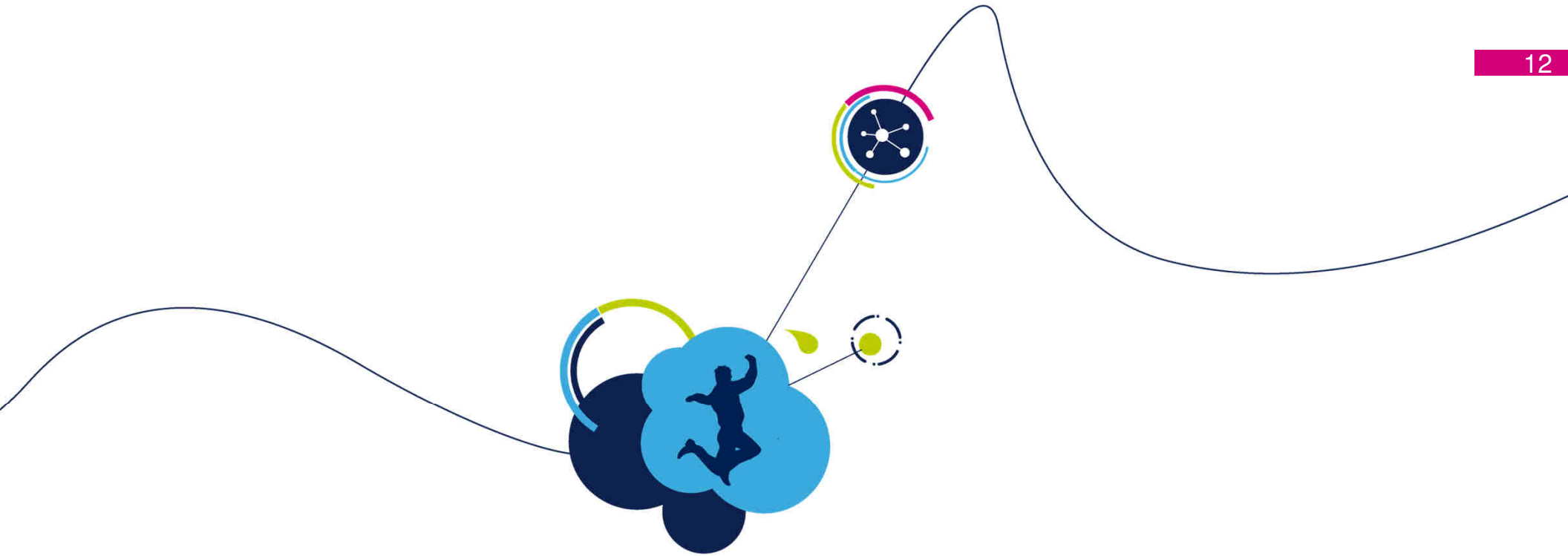


- TFT controller for medium resolutions (up to XGA) and new generation MiP low power displays



- MIPI-DSI interface for medium resolutions, high pixel density GUI, mainly consumer today





STM32 Graphics Software and Tools

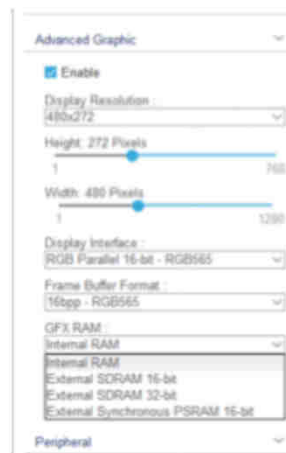


Free State-of-the-art Graphic Software and Tools

Find the best STM32 fit with our Graphic Selector and Simulator added in CubeMX

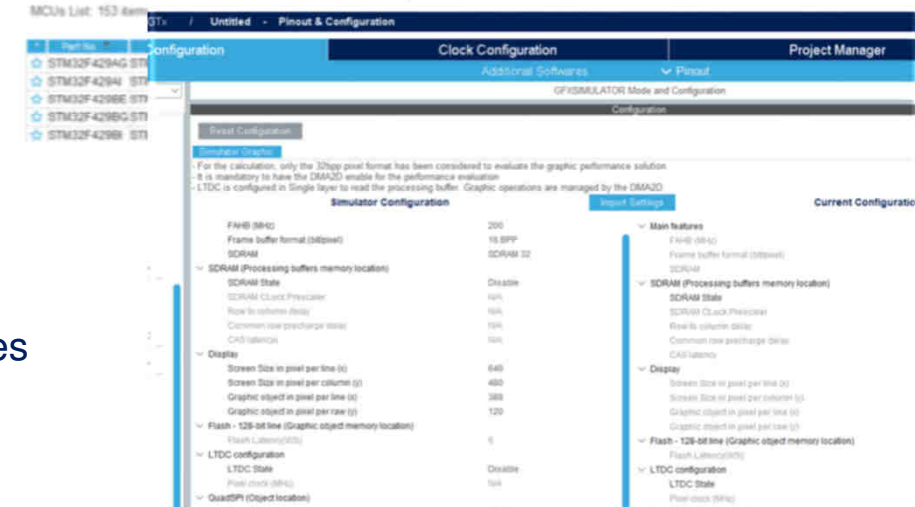
• CubeMX Graphic Selector

- Select your STM32 based on
 - Display resolution
 - Color depth
 - Memory interfaces
 - Expected performance



• CubeMX Graphic Simulator

- Fine tune your architecture and configuration
- Simulate expected performance based on your choices





TouchGFX Graphics Framework

Now Part of the STM32 Ecosystem

TouchGFX is a software framework written in C++ that unlocks the graphical user interface of STM32 hardware.

The technology lets you create high-end GUIs that fully live up to today's smartphone standards at a fraction of the cost.

TouchGFX is integrated with the STM32Cube ecosystem.

TouchGFX is FREE with STM32!

