

# **MSPM0 accelerator module introduction**

— **MSPM0 peripheral training series**

**Presented by Johnson He**

# MCU level overview

## —MSPM0Gxx series

**MSPM0G350x/310x/150x/110x** 1.62 - 3.6V  
-40 to 125 C

<b>CPU</b> Arm Cortex-M0+ 80 MHz  NVIC / MPU / 7-ch DMA	<b>Power &amp; Clocking</b>	<b>Precision Analog</b>
	POR / BOR / SVS	12-bit ADC 4Msps (9-ch)
	External LF 32kHz XTAL	12-bit ADC 4Msps (8-ch)
	External HF 4-48MHz XTAL	Comparators w/ 8-bit DACs (3)
	Internal LF 32kHz (3%)	12-bit 1Msps buffered DAC (1)
	Internal HF 4-32MHz (1%)	Zero-drift chopper op-amps (2)
	PLL (up to 80 MHz)	Internal reference (1.5%)
		General purpose amp (1)
		Temperature sensor
<b>Accelerators</b>	<b>Communication</b>	<b>Timers</b>
Math (DIV, SQRT, TRIG, MAC)	UART w/ LIN (1)	Advanced control 16-bit 4 CC (1)
	UART (3)	Advanced control 16-bit 2 CC (1)
<b>On-chip Memory</b>	SPI (2)	General purpose 32-bit 2 CC (1)
32, 64, or 128 kB flash [ECC]	I2C (2) w/ FastMode+	General purpose 16-bit 2 CC (2)
16 or 32 kB SRAM [ECC]	CAN-FD (1)	Low power 16-bit 2 CC (2)
<b>Data Integrity &amp; Security</b>	<b>IO</b>	Windowed watchdog (2)
CRC accelerator (16 and 32 bit)	Up to 60 GPIO	Real-time clock (1)
AES256 accelerator + TRNG		
<b>Programming &amp; Debug</b>		
ARM SWD interface		
UART & I2C bootloader		

Leaded packages: VSSOP-20/28, LQFP-48/64  
No-lead packages: VQFN-24/32/48, nFBGA-64, WCSP-28

**Accelerator Module**  
Math(DIV, SQRT, TRIG, MAC)

80 MHz MCU with up to 128kB flash, 64 pins, advanced analog, AES/TRNG, CAN-FD

# MSPM0G350x accelerator module introduction

## Key Features

### Divider:

- 32bit hardware divider for fixed point and IQ format numbers
  - Divide operation in **8 cycles**

### MAC

- Multiply-Accumulate operation in **2 cycles**

### Square:

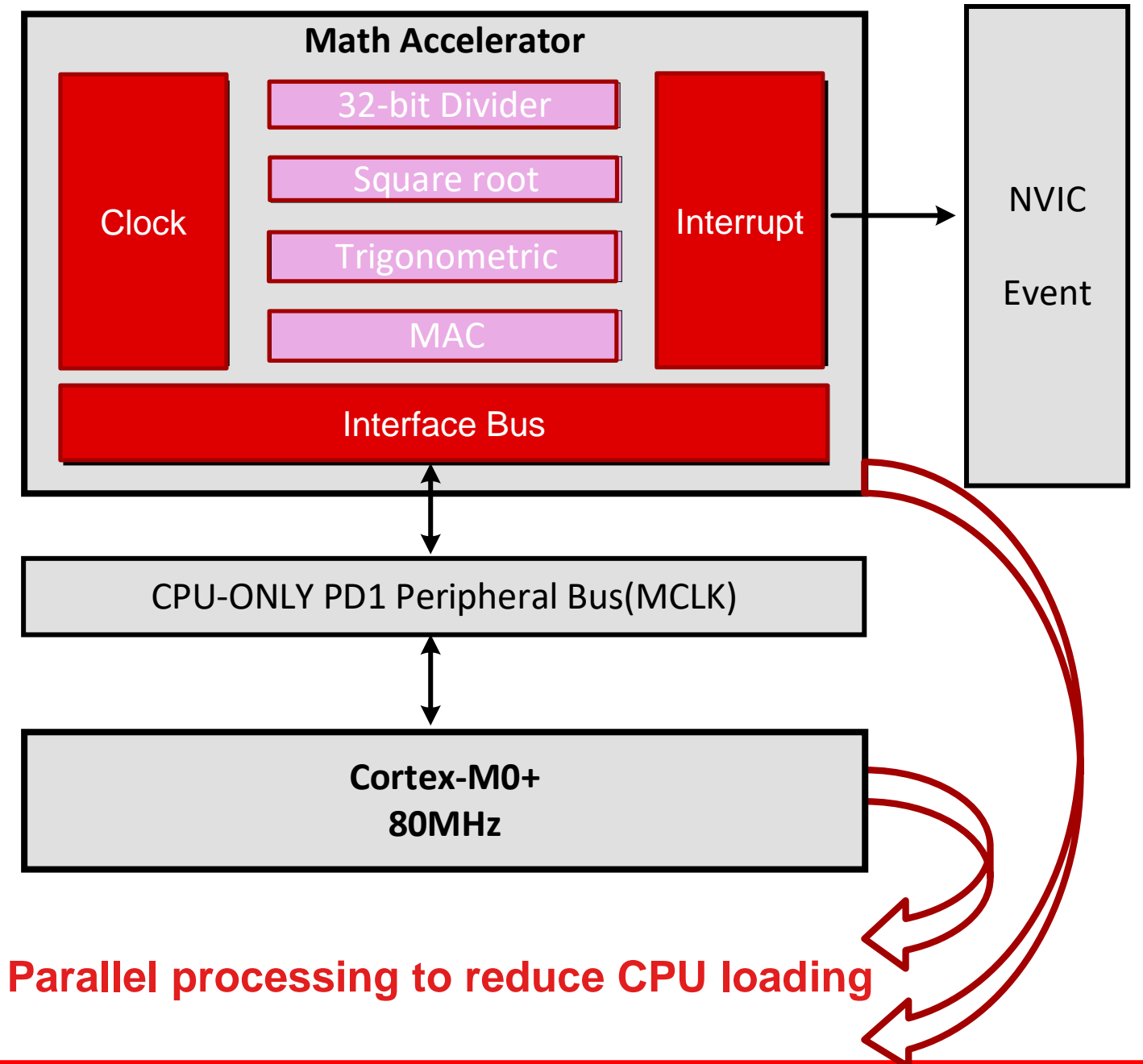
- Square root operation in **21 cycles**

### Trigonometric:

- 24bit trigonometric calculations (sin, cos, atan)
  - 24bit accuracy operation in **29 cycles**
  - Configurable resolution for lower computation cycles

## Application

- Significantly reduce the calculation time of division, square root and trigonometric calculations.
- Increase the computational power for math intensive and real time critical tasks.
- Speed up the control loop in application like motor control FOC and digital power control system.
- Lower the power consumption for math calculation with accelerator executed in parallel to CPU operation.



# Accelerator module quick start

## Academy

[MSPM0 introduction lab](#)

## Driverlib Examples

### MSPM0G350x:

- mathacl\_mpy\_div\_op
- mathacl\_trig\_op

### MSPM0L130x:

No accelerator module

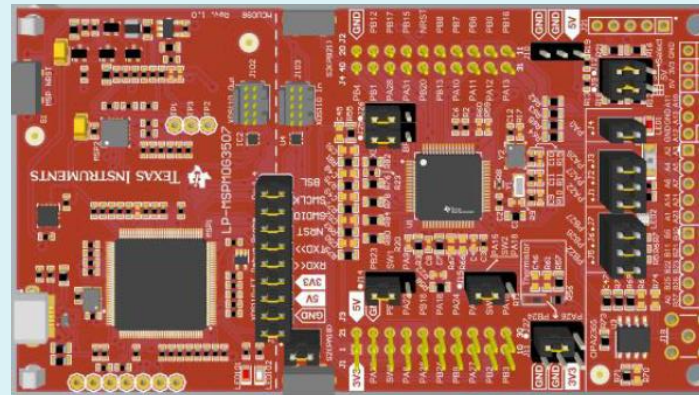
## Related Links

- [MSPM0 online resource](#)
- [MSPM0 Quick start guide](#)
- [MSPM0 Sysconfig user's guide](#)

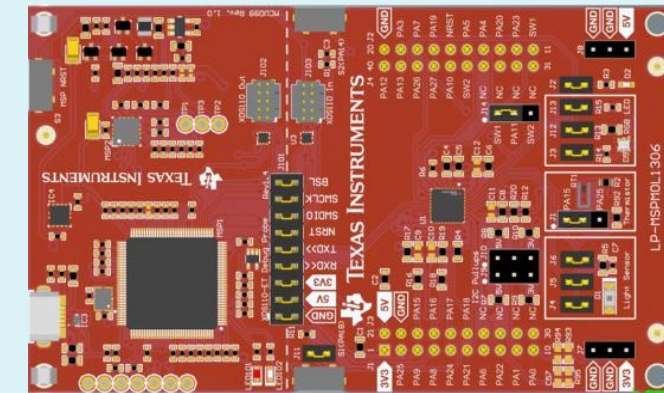
- [MSPM0G350x datasheet](#)
- [MSPM0L13xx datasheet](#)
- [MSPM0Gxx technical reference manual](#)
- [MSPM0Lxx technical reference manual](#)

## Launchpad

[LP-MSPM0G3507](#)



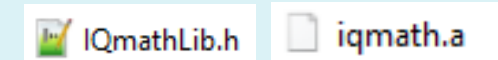
[LP-MSPM0L1306](#)



## Easy to Use with IQMath

New version IQMath will call accelerator module automatically

Step 1: Add IQmathLib.h & iqmath.a file into your project:



Step 2: Define IQ format variable using \_iqxx: `_iq24 Var_iq24`

Step 3: Run IQMath function: `_IQ24div(Var1_iq24, Var2_iq24);`

# To find more MSPM0 training series, please visit:

- [Ti.com.cn](http://ti.com.cn)
- [WeChat \(德州仪器公众号\)](#)
- [Bilibili](#)
- [21IC](#)