

# **MSPM0 true random number generator(TRNG) module introduction**

— MSPM0 peripheral training series

**Presented by Cash Hao**

# MCU level overview

## —MSPM0Lxx series

### MSPM0L13x3/4/5/6

<b>CPU</b> <b>ARM Cortex-M0+</b> <b>32 MHz</b>  NVIC / 3-ch DMA	<b>Power &amp; Clocking</b> POR / BOR / SVS Internal LF 32kHz (5%) Internal HF 4-32MHz (1%)	<b>Precision Analog</b> 12-bit SAR ADC 1Msps (1) ULP/HS Comparator (1) 8-bit reference DAC (1) Zero-drift chopper op-amps (2) General purpose amp (1) Internal ADC reference (2.5%) Temperature sensor
<b>On-chip Memory</b> 8, 16, 32 or 64 kB flash 2 or 4 kB SRAM	<b>Communication</b> UART w/ LIN (1) UART (1) SPI (1) I2C (2) w/ FastMode+	<b>Timers</b> General purpose 16-bit 2 CC (4) Windowed watchdog
<b>Data Integrity &amp; Security</b> CRC accelerator (16 and 32 bit)	<b>IO</b> Up to 28 GPIO Up to 2 low Ib OPA inputs	
<b>Programming &amp; Debug</b> ARM SWD interface ROM UART & I2C BSL		

Ledged packages: SOT-16, VSSOP-20/28  
 No-lead packages: WQFN-16, VQFN-24/32

1.62 - 3.6V  
-40 to 125 C

*32 MHz MCU with up to 64kB flash, 32 pins, 12-bit ADC, dual zero-drift OPA/PGA, COMP*

## —MSPM0Gxx series

### MSPM0G350x/310x/150x/110x

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

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

1.62 - 3.6V  
-40 to 125 C

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

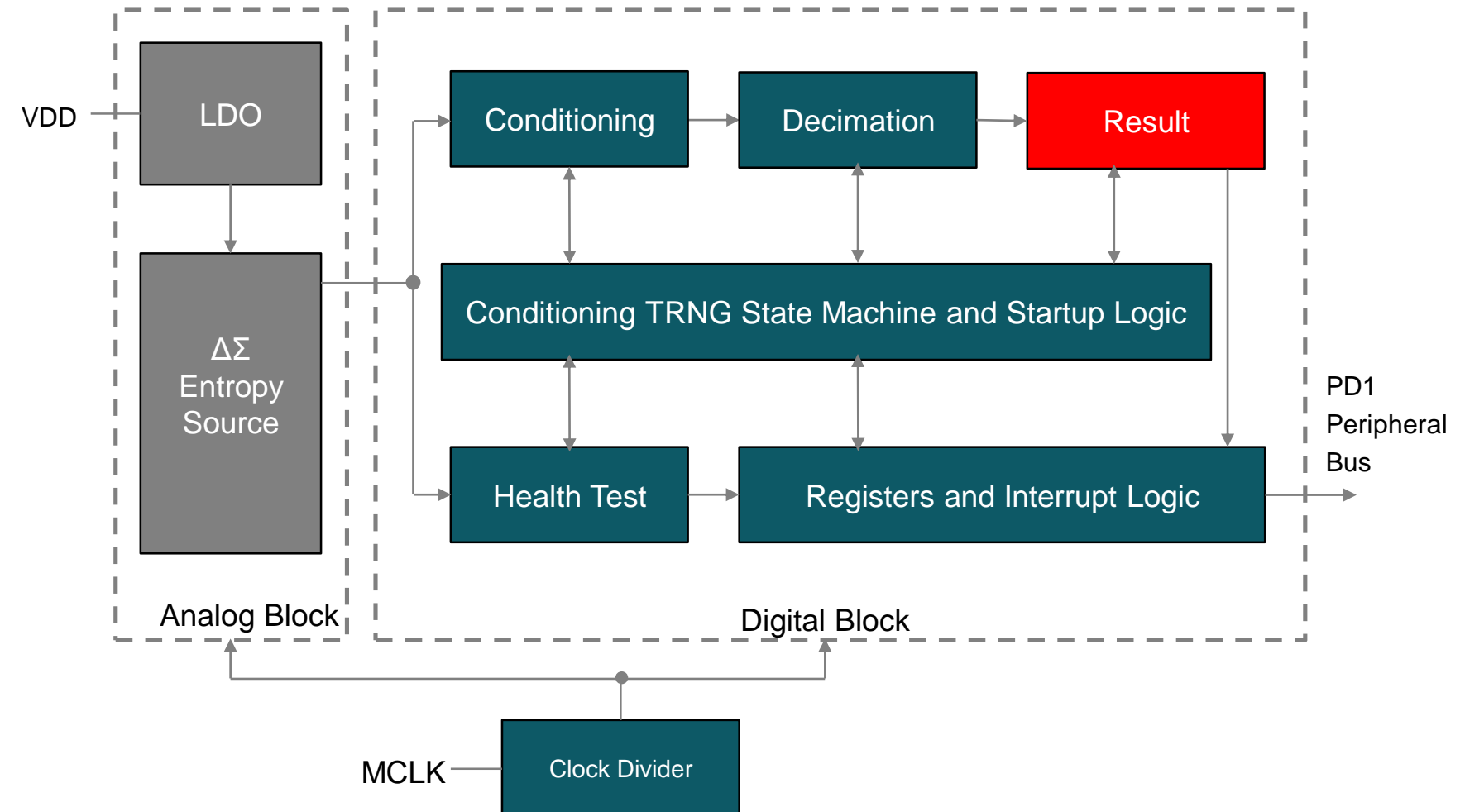
# MSPM0G350x TRNG module introduction

## Key Features

- 32-bit true random number output
- **TYP 6.4us** for generating one 32bit true random data
- **TYP 51.2us** for generating one 256bit true random data
- Integrated startup and continuous health tests, compliant to **NIST SP800-22**
- Dedicated internal LDO regulator to defend against power manipulation attacks

## Key Differences between G and L MCUs

- MSPM0G350x MCUs have 1 TRNG module



# Clock module quick start

## Academy

[TRNG introduction lab](#)

## Driverlib Examples

MSPM0G350x:

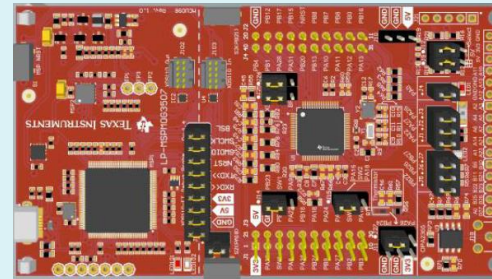
- trng\_sample
- trng\_sample\_stop\_restore

## Related Links

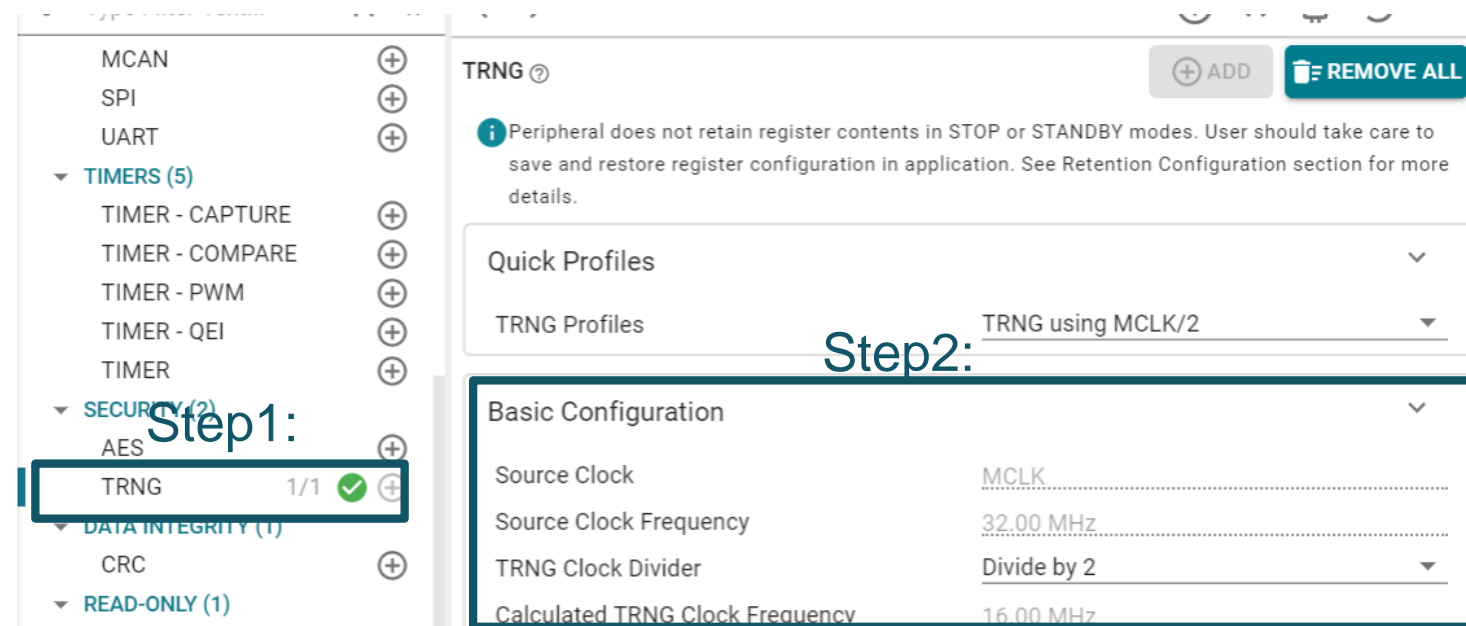
- [MSPM0 online resource](#)
- [MSPM0 Quick start guide](#)
- [MSPM0 Sysconfig user's guide](#)
  
- [MSPM0G350x datasheet](#)
- [MSPM0Gxx technical reference manual](#)

## Launchpad

LP-MSPM0G3507



## Sysconfig Entrance for TRNG Setting



The screenshot shows the Sysconfig tool interface. On the left, a tree view lists various peripherals. The 'TRNG' entry is highlighted with a red box and labeled 'Step 1:'. On the right, the TRNG configuration panel is shown. It includes a warning message: 'Peripheral does not retain register contents in STOP or STANDBY modes. User should take care to save and restore register configuration in application. See Retention Configuration section for more details.' Below this, there are dropdown menus for 'Quick Profiles' and 'TRNG Profiles'. The 'TRNG Profiles' dropdown is set to 'TRNG using MCLK/2' and is labeled 'Step 2:'. A table below shows the configuration details:

Parameter	Value
Source Clock	MCLK
Source Clock Frequency	32.00 MHz
TRNG Clock Divider	Divide by 2
Calculated TRNG Clock Frequency	16.00 MHz

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