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**

**CPU**
- ARM Cortex-M0+
- 32 MHz
- NVIC / 3-ch DMA

**On-chip Memory**
- 8, 16, 32 or 64 kB flash
- 2 or 4 kB SRAM

**Data Integrity & Security**
- CRC accelerator (16 and 32 bit)

**Programming & Debug**
- ARM SWD interface
- ROM UART & I2C BSL

**Power & Clocking**
- POR / BOR / SVS
- Internal LF 32kHz (5%)
- Internal HF 4-32MHz (1%)

**Communication**
- UART w/ LIN (1)
- UART (1)
- SPI (1)
- I2C (2) w/ FastMode+

**Timers**
- General purpose 16-bit 2 CC (4)
- Windowed watchdog

**Precision Analog**
- 12-bit SAR ADC 1Msp (1)
- ULP/HS Comparator (1)
- 8-bit reference DAC (1)
- Zero-drift chopper op-amps (2)

**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**

**CPU**
- Arm Cortex-M0+
- 80 MHz
- NVIC / MPU / 7-ch DMA

**On-chip Memory**
- 32, 64, or 128 kB flash [ECC]
- 16 or 32 kB SRAM [ECC]

**Data Integrity & Security**
- CRC accelerator (16 and 32 bit)
- AES256 accelerator + TRNG

**Programming & Debug**
- ARM SWD interface
- UART & I2C bootloader

**Power & Clocking**
- POR / BOR / SVS
- External LF 32kHz XTAL
- External HF 4-48MHz XTAL
- Internal HF 4-32kHz (3%)
- Internal HF 4-32MHz (1%)
- PLL (up to 80 MHz)

**Accelerators**
- Math (DIV, SQRT, TRIG, MAC)

**Timers**
- 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)
- Real-time clock (1)

**Precision Analog**
- 12-bit ADG 4Msp (6-ch)
- 12-bit ADG 4Mps (6-ch)
- Comparators w/ 8-bit DACs (3)
- 12-bit 1Mps buffered DAC (1)
- Zero-drift chopper op-amps (2)
- Internal reference (1.5%)
- General purpose amp (1)
- Temperature sensor

**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 32-bit true random data
- TYP 51.2us for generating one 256-bit 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

![Diagram of TRNG module and its components](image)
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

Step 1:

Step 2:
TRNG using MCLK/2

Basic Configuration
- Source Clock
  - MCLK
- Source Clock Frequency
  - 32.00 MHz
- TRNG Clock Divider
  - Divide by 2
- Calculated TRNG Clock Frequency
  - 16.00 MHz
To find more MSPM0 training series, please visit:

- Ti.com.cn
- WeChat (德州仪器公众号)
- Bilibili
- 21IC