Renesas RA Family

NIST SP800-90B Entropy Assessment Report for RA6M5

Result	**Pass/Fail**	**Pass**
	Description	The minimum entropy of the noise source gained from the target was estimated at **0.833925** per 1 bit. This satisfies the criteria decided by the client (sample min entropy > 0.375). Therefore, the assessment for RA6M5 is **PASS**.

This report indicates the result of the in-company entropy assessment done for RA6M5. Note that the assessment was not done fully compliant (*1) to NIST SP800-90B and was not done by a NIST accredited laboratory.

The following standard and tool were used for this statistical test of the evaluation sample:

- Special Publication 800-90B
  Recommendation for the Entropy Sources Used for Random Bit Generation, January 2018, NIST
- Test tool: SP800-90B_EntropyAssessment
  The tool is downloadable from the following web site:
  https://github.com/usnistgov/SP800-90B_EntropyAssessment

(*1) Omitted "Restart Test". No stochastic model of the RNG provided. No $H_{submitter}$ provided.

Conditions of the assessment:

Evaluation sample	**Brief**	The random sequence obtained from RA6M5.
	File name	RA6M5 Random Number Data 20210921.zip
	Provided by	IoT Product Marketing Department 1 Section 2 IoT Platform Business Division IoT and Infrastructure Business Unit Renesas Electronics Europe GmbH
	Date provided	September 21, 2021
Testing department		Security Competence Center Shared R&D Core Technology Division IoT and Infrastructure Business Unit Renesas Electronics Corporation
Test started on		February 9, 2023
Test completed on		February 13, 2023
NIST SP800-90B Conditions	**Sample type**	Non-IID tracks.
	Initial entropy estimation	Done (for Non-IID tracks).
	Restart test	Not done.

Website and Support

Visit the following URLs to learn about key elements of the RA family, download components and related documentation, and get support:

RA Product Information	www.renesas.com/ra
RA Product Support Forum	community.renesas.com/mcu-mpu/ra/
RA Flexible Software Package	www.renesas.com/FSP
Renesas Support	www.renesas.com/support

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Feb.22.23	—	Initial release

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on

   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins

   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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