



Test Report

Sample Name: _____ The integrated circuit _____

Sample Type: _____ STM32F412RGT6 _____

Manufacturer: _____ ST _____

Customer: _____ _____

Chuangxin Online Test Center Laboratory

February 21, 2024

Test Report

Customer:

Customer Address: N/A

Sample Name: The integrated circuit

Sample Type: STM32F412RGT6

Manufacturer: ST

Date Code: 2320

Package Type: LQFP-64

Sample Amount: 1 PCS

Check Amount: 1 PCS

Arrived Date: 02/21/2024

Testing Date: 02/21/2024/09: 00 - 02/21/2024/14: 20

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Tested by _____

Inspected by _____

Approved by _____

Test Item

External visual inspection

Pin correlation test

Programming test

Solderability analysis

Radiography(X-ray)

XRF test

Key functional test(KFT)

Baking

Tape and reel

Top permanency test

Internal visual inspection

SAT test

Cross section

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Methods & Equipment

1.1 Test standard:

- **AS6081A-2023**

1.2 Optical microscope:

- Equipment spec:

Optical microscope: SEZ-260 X7-X45(Due date: 7/18/2024)

1.3 Digital caliper:

- Equipment spec:

Digital caliper: (0~150) mm(Due date: 7/18/2024)

1.4 Functional test equipment:

- Equipment spec:

Xeltek programming unit: 6100N(Due date: 7/18/2024)

1.5 Product datasheet:

- 《ST STM32F412RGT6》 :

<https://www.st.com/content/ccc/resource/technical/document/datasheet/15/90/07/b3/8c/10/4e/95/DM00213872.pdf/files/DM00213872.pdf/jcr:content/translations/en.DM00213872.pdf>

Analysis Summary

External visual inspection:

Applicable standard: **AS6081A-2023**

External visual inspection on 1 PCS sample. No secondary coating, sanding marks, crack or chips were observed on all inspected. Leads show minor indentation on all inspected. Devices package and dimension matched to manufacturer's specification. All devices passed the external visual inspection.

(1) Specification dimension:

- D: 12.00 BSC mm
- E: 12.00 BSC mm
- A: 1.60 MAX mm

(2) Measurement dimension:

- D: 12.00 mm
- E: 12.00 mm
- A: 1.51 mm

External visual criteria	Yes/No	Result
Mix-up	No	Pass
Top scratches	No	Pass



Bottom scratches	No	Pass
Chips	No	Pass
Residues	No	Pass
Indentation	Yes	Pass
Contamination	No	Pass
Cracks	No	Pass
Copper defect	No	Pass
Oxidization	No	Pass
Coplanarity	Yes	Pass
Sanding marks	No	Pass
Secondary coating	No	Pass
Top permanency test	N/A	N/A



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Programming test results:

Programming test	Results:
Total quantity tested	1 PCS
Total quantity passed	1 PCS
Total quantity failed	0 PCS
Note	All devices passed programming test.

Programming test results	
Tested parameters	Results
Pin continuity	Pass
ID check	Pass
Blank check	Pass
Program	Pass
Verify	Pass
Erase	Pass
Blank check	Pass

Table 102. LQFP64 - Mechanical data

Symbol	millimeters			inches ⁽¹⁴⁾		
	Min	Typ	Max	Min	Typ	Max
A	-	-	1.60	-	-	0.0630
A1 ⁽¹²⁾	0.05	-	0.15	0.0020	-	0.0059
A2	1.35	1.40	1.45	0.0531	0.0551	0.0570
b ⁽⁹⁾⁽¹¹⁾	0.17	0.22	0.27	0.0067	0.0087	0.0106
b1 ⁽¹¹⁾	0.17	0.20	0.23	0.0067	0.0079	0.0091
c ⁽¹¹⁾	0.09	-	0.20	0.0035	-	0.0079
c1 ⁽¹¹⁾	0.09	-	0.16	0.0035	-	0.0063
D ⁽⁴⁾	12.00 BSC			0.4724 BSC		
D1 ⁽²⁾⁽⁵⁾	10.00 BSC			0.3937 BSC		
E ⁽⁴⁾	12.00 BSC			0.4724 BSC		
E1 ⁽²⁾⁽⁵⁾	10.00 BSC			0.3937 BSC		
e	0.50 BSC			0.1970 BSC		
L	0.45	0.60	0.75	0.0177	0.0236	0.0295
L1	1.00 REF			0.0394 REF		
N ⁽¹³⁾	64					
θ	0°	3.5°	7°	0°	3.5°	7°
θ1	0°	-	-	0°	-	-
θ2	10°	12°	14°	10°	12°	14°
θ3	10°	12°	14°	10°	12°	14°
R1	0.08	-	-	0.0031	-	-
R2	0.08	-	0.20	0.0031	-	0.0079
S	0.20	-	-	0.0079	-	-
aaa ⁽¹⁾	0.20			0.0079		
bbb ⁽¹⁾	0.20			0.0079		
ccc ⁽¹⁾	0.08			0.0031		
ddd ⁽¹⁾	0.08			0.0031		



3. Receiving inspection:

Gross Weight	13 g	Parts Total	1 PCS
Number of Boxes	N/A	Full Label	Exist
Package Type	Bulk	Moisture Protection	Exist
MSL	3	ESD Protection	Exist

Note: All devices contain 1 PCS sample.



4. External visual inspection:

Applicable standard: **AS6081A-2023**

Ambient temperature: 25.1 °C Relative humidity: 57.2 % RH

External visual inspection on 1 PCS sample. No secondary coating, sanding marks, crack or chips were observed on all inspected. Leads show minor indentation on all inspected. Devices package and dimension matched to manufacturer's specification. All devices passed the external visual inspection.

(1) Specification dimension:

- D: 12.00 BSC mm
- E: 12.00 BSC mm
- A: 1.60 MAX mm

(2) Measurement dimension:

- D: 12.00 mm
- E: 12.00 mm
- A: 1.51 mm

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Package dimension

Figure 65. LQFP64 - Outline⁽¹⁵⁾

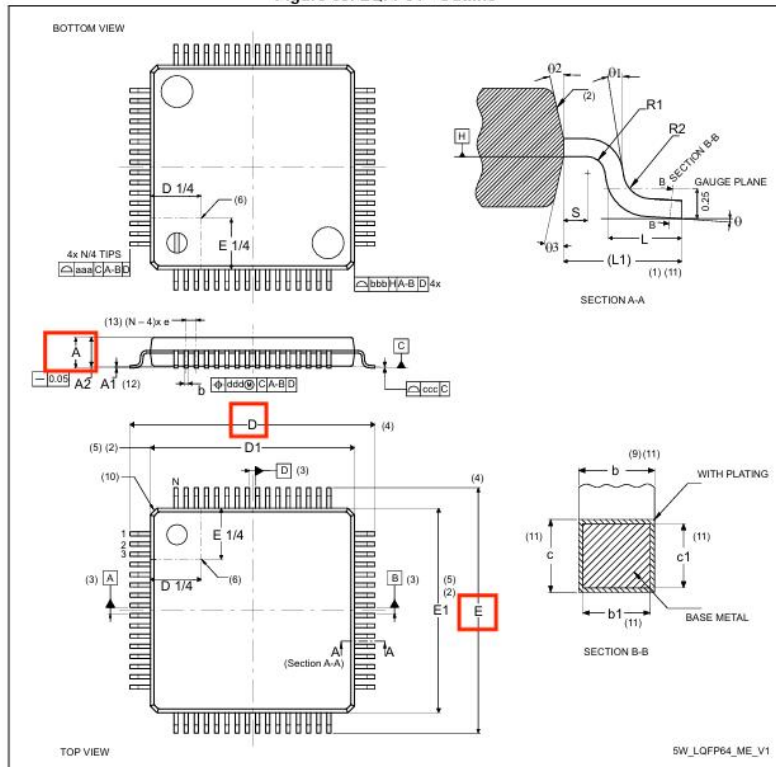
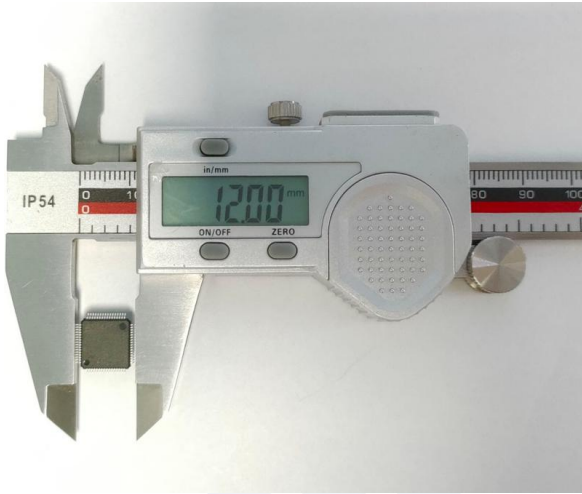


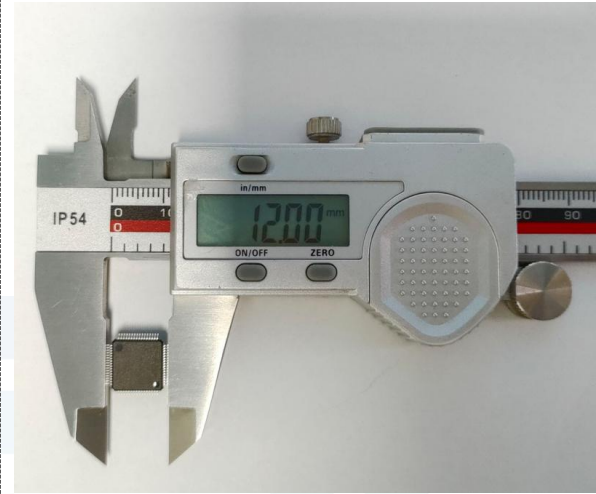
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c ⁽¹¹⁾	0.09	-	0.20	0.0035	-	0.0079
c1 ⁽¹¹⁾	0.09	-	0.16	0.0035	-	0.0063
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E ⁽⁴⁾	12.00 BSC			0.4724 BSC		
E1 ⁽²⁾⁽⁵⁾	10.00 BSC			0.3937 BSC		
e	0.50 BSC			0.1970 BSC		
L	0.45	0.60	0.75	0.0177	0.0236	0.0295
L1	1.00 REF			0.0394 REF		
N ⁽¹³⁾	64					
θ	0°	3.5°	7°	0°	3.5°	7°
θ1	0°	-	-	0°	-	-
θ2	10°	12°	14°	10°	12°	14°
θ3	10°	12°	14°	10°	12°	14°
R1	0.08	-	-	0.0031	-	-
R2	0.08	-	0.20	0.0031	-	0.0079
S	0.20	-	-	0.0079	-	-
aaa ⁽¹⁾	0.20			0.0079		
bbb ⁽¹⁾	0.20			0.0079		
ccc ⁽¹⁾	0.08			0.0031		
ddd ⁽¹⁾	0.08			0.0031		

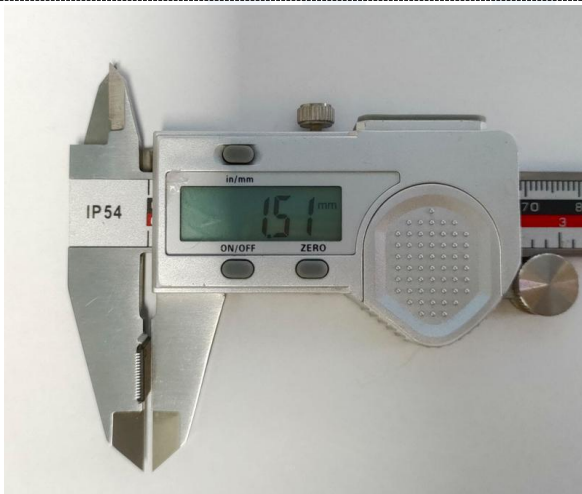
D = 12.00 mm



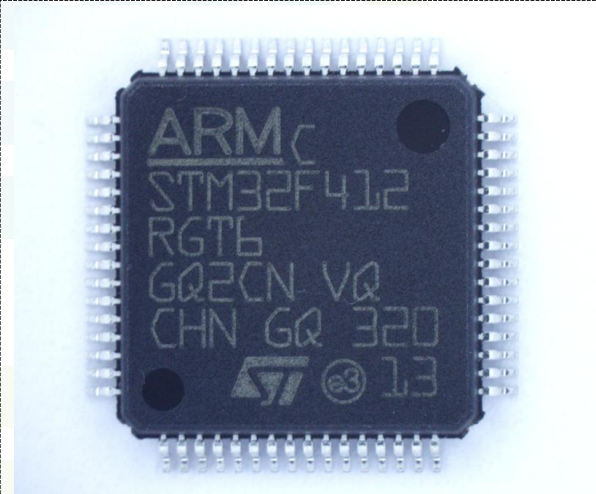
E = 12.00 mm



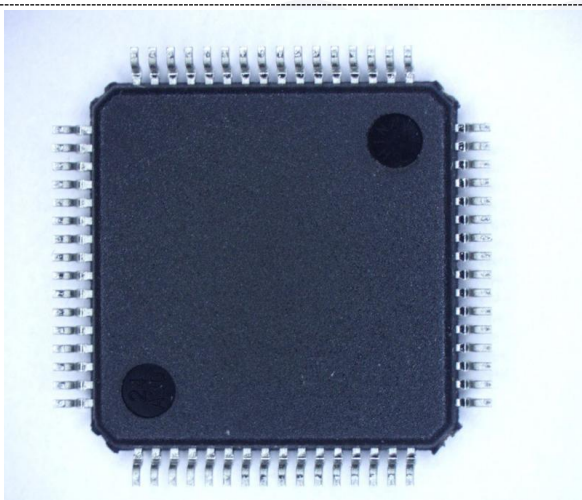
A = 1.51 mm



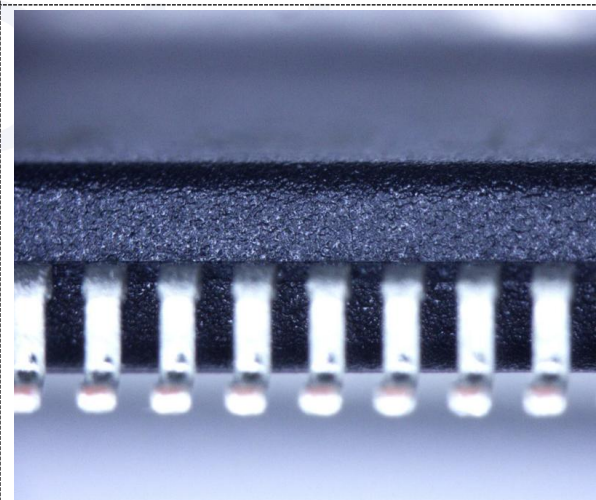
Top

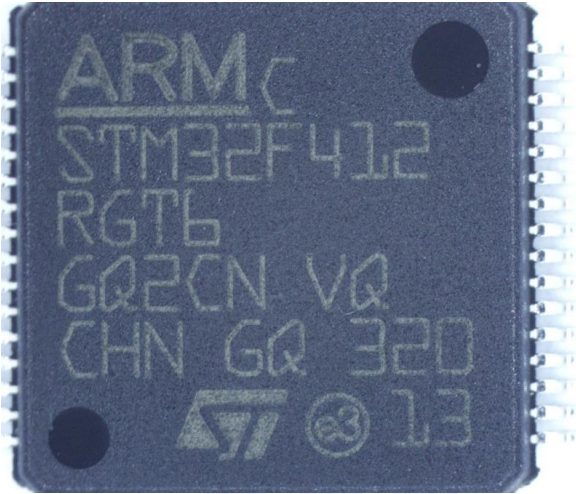
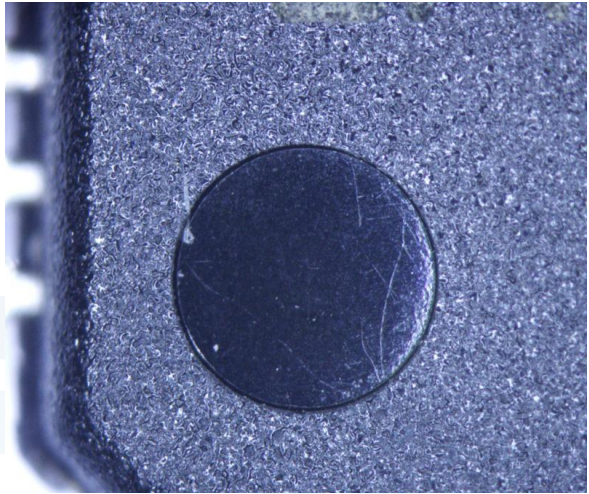
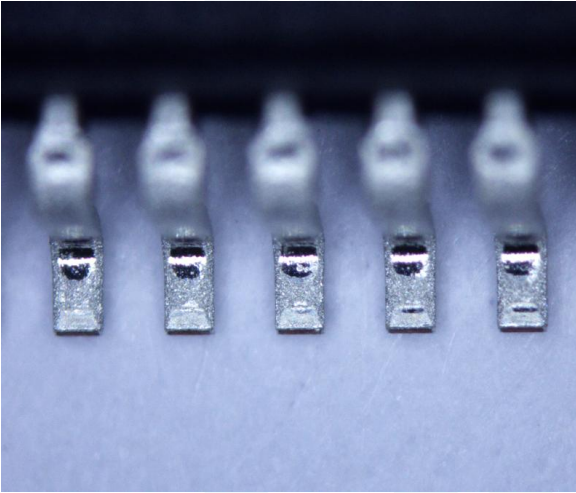
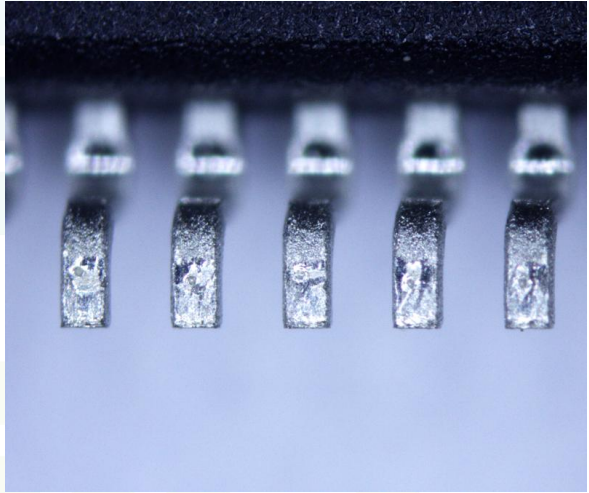
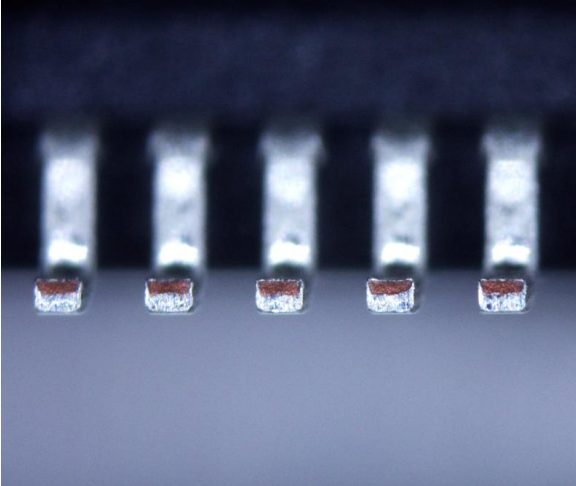
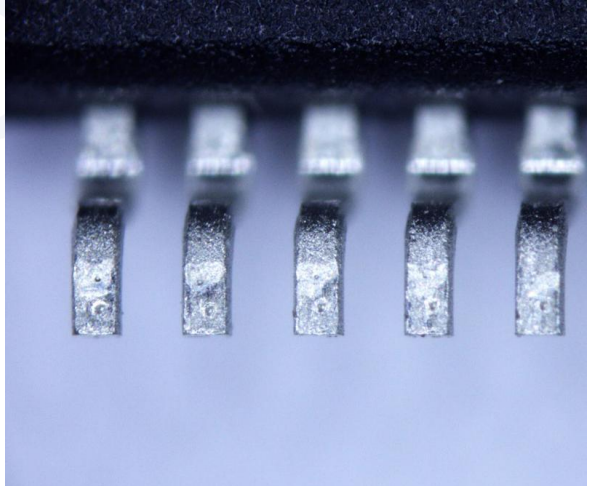


Bottom



Side



<p>Marking</p>	<p>Top pin</p>
 <p>ARM C STM32F412 RGT6 GQ2CN VQ CHN GQ 320 17 13</p>	
<p>Top leads</p>	<p>Bottom leads</p>
	
<p>Leads end</p>	<p>Indentation</p>
	



5. Programming test:

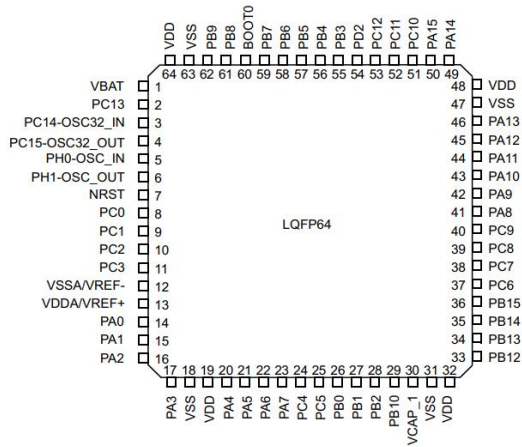
Applicable standard: **AS6081A-2023**

Ambient temperature: 24.7 °C Relative humidity: 53.9 % RH

Devices were tested for the followings using Xeltek platform:

- Pin continuity: Wrong chip insertion check. Prevent chips from accidental damage.
- ID Check: Device ID is the code read from the chip to identify the manufacturer and the device type. If the device ID is unmatched, an error will occur.
- Blank Check: Ensure no program on device.
- Program: Devices are programmed with random data.
- Verify: The function compares the content of the buffer to that of the chip. If there is any discrepancy, verification will cease and failure message will be displayed. Only the chips that pass verification can be recognized as chips being programmed correctly.
- Erase: Erase the chip to blank state. This operation can only be executed with the chip that can be erased electrically.
- Blank Check: Ensure no program on device.

Device pinout



Select Parts

Supported by Programmer Models: /SP6100N

Search: STM32F412RG

Device Type: ALL

Manufacturer: ST

Device Name: STM32F412RG@Q64

Buttons: DevInfo, OK, Cancel

Operation Option

Option

General: Insertion Test, ID Check

Buffer: Beeper On, Sound On

Verify Mode: Once with Vcc, Twice with Vcc +/- 5%, Twice with Vcc +/- 10%

Checksum: Default Mode, Flash, OTP

Buttons: OK, Cancel

Edit Auto

Device Functions:

- Program
- Read
- Verify
- Blank_Check
- Erase
- Option_Byte
- OTP_Program
- OTP_Read
- OTP_Verify
- OTP_BlankCheck
- OTP_Lock

Buttons: Add, Delete, Delete All, OK, Cancel

Auto: Blank_Check, Program, Verify, Erase, Blank_Check

Erase when blank checking error

Edit Buffer

ADDRESS	HEX	ASCII
00000000	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
00000001	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
00000002	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
00000003	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
00000004	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
00000005	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
00000006	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
00000007	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
00000008	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
00000009	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
0000000A	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
0000000B	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
0000000C	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
0000000D	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
0000000E	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666
0000000F	36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36	6666666666666666

Fill Data into Buffer

Fill Start Address (Hex): 0

Fill End Address (Hex): FFFF

Fill data (Hex): 36

Buttons: OK, Cancel

Address: 00000000H Checksum: 03600000H Buffer clear on data load

Buffer range: 0000000000H - 0000FFFFFFH

Buttons: Locate, Copy, Fill, Search, Search Next, Radix, Swap, Duplicate, OK

Test result (Pass)

SP6100N - SUPERPRO for Windows V1.0

Device: ST STM32F412RG@Q64 Flash:1000000HS+OTP:200H8 64Pins

Operation Option: Edit Auto, Dev. Config, Dev. Info, Data Compare

Auto: Preparing... ST STM32F412RG@Q64 Algo: STM32412 (8/26/2019) Checksum: 0FF00000H Ready. Checksum: 0FF00000H Checksum: 03600000H Please, insert a new device into the socket. Blank_Checking ... Blank_Check OK! Programming ... Program OK! Verifying ... Verification OK! Erasing ... Erase OK! Blank_Checking ... Blank_Check OK! 0:00:39*78 elapsed. Please, remove the device from the socket.

Success: 1, Failure: 0, Total: 1

Count down: Disabled, Count Total: 0, Remains: 0

Buttons: Reset, Reset Count Down, CANCEL

Programming test	Results:
Total quantity tested	1 PCS
Total quantity passed	1 PCS
Total quantity failed	0 PCS
Note	All devices passed programming test.

-End of Report-

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Disclaimer

1. The test report is invalid without the stamp of “company seal” and “cross-page seal”.
2. The copy of the test report is invalid without the stamp of “company seal” and “cross-page seal”.
3. The test report is invalid without the signatures of operator, supervisor and manager.
4. A modified or partial copy of the test report is invalid.
5. When there is disagreement with the test report, please submit the issue to us within 15 days from the date of receipt. Overdue information will not be accepted.
6. The test report is only reflective of the test results of testing samples, not of the quality of batch products.
7. The * indicates subcontract test data.



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