

Security Assessment PANDIANAONSOL

Vital Block Verified on July 4th, 2024



















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INTRODUCTION

Auditing Firm	VITAL BLOCK SECURITY
Client Firm	PANDIANAONSOL
Methodology	Automated Analysis, Manual Code Review
Language	Rust
Contract	PNDAhF2ChmBqNFyGXwLEvo5A8Am5ASFcYZ5X59sND12
Source Code Light	Verified
Token Standard	2
Centralization	Active ownership
Edition Nonce	255
Blockchain	SOLANA
Website	https://pandiana.io/
Telegram	https://t.me/pandianaonsol
Twitter ("x")	https://x.com/pandianaonsol
Discord	https://discord.gg/pandiana
Prelim Report Date	July 3 rd 2024
Final Report Date	July 4 th 2024

■ Verify the authenticity of this report on our GitHub Repo: https://www.github.com/vital-block





Document Properties

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Version	Date	Author(s)	Description
1.0	July 3 rd , 2024	James BK	Final Released
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In the following, we show the specific pull request and the commit hash value used in this audit.

- https://solscan.io/token/PNDAhF2ChmBqNFyGXwLEvo5A8Am5ASFcYZ5X59sND12 (PEN178761)
- https://explorer.solana.com/address/PNDAhF2ChmBqNFyGXwLEvo5A8Am5ASFcYZ5X59sND12 (PENU144790)

About Vital Block Security

Vital Block Security provides professional, thorough, fast, and easy-to-understand smart contract security audit. We do indepth and penetrative static, manual, automated, and intelligent analysis of the smart contract. Some of our automated scans include tools like ConsenSys MythX, Mythril, Slither, Surya. We can audit custom smart contracts, DApps, Rust, NFTs, etc (including the service of smart contract auditing). We are reachable at Telegram (https://t.me/vital_block), Twitter (https://twitter.com/Vb_Audit), or Email (info@vitalblock.org).

High Critical Medium High Medium High Low Medium Medium Low Low Low High Medium Low Likelihood

Table 1.2: Vulnerability Severity Classification

Methodology (1)

To standardize the evaluation, we define the following terminology based on the OWASP Risk Rating Methodology [4]:

- <u>Likelihood</u> represents how likely a particular vulnerability is to be uncovered and exploited in the wild:
- Impact measures the technical loss and business damage of a successful attack;
- Severity demonstrates the overall criticality of the risk.





SCOPE OF WORK

Vital Block was consulted by PANDIANAONSOL to conduct the smart contract audit of its. Rust source code. The audit scope of work is strictly limited to mentioned .Rust file only:

O.PNDA.Rust

External contracts and/or interfaces dependencies are not checked due to being out of scope.

Verify audited contract's contract address and deployed link below:

Public Contract Address

https://solscan.io/token/PNDAhF2ChmBqNFyGXwLEvo5A8Am5ASFcYZ5X59sND12

Contract Name	PANDIANAONSOL
Token Symbol	PNDA
Decimals	5
Total Supply	10,000,000





Table 1.0 The Full Audit Checklist

Category	Checklist Items	
	Constructor Mismatch	
	Ownership Takeover	
	Redundant Fallback Function	
	Overflows & Underflows	
	Reentrancy	
	Money-Giving Bug	
	Blackhole	
	Unauthorized Self-Destruct	
	Revert DoS	
Basic Coding Bugs	Unchecked External Call	
	Gasless Send	
	Send Instead Of Transfer	
	Costly Loop	
	(Unsafe) Use Of Untrusted Libraries	
	(Unsafe) Use Of Predictable Variables	
	Transaction Ordering Dependence	
	Deprecated Uses	
Semantic Consistency Checks	Semantic Consistency Checks	
	Business Logics Review	
	Functionality Checks	
	Authentication Management	
	Access Control & Authorization	
	Oracle Security	
Advenced DoFi Couving	Digital Asset Escrow	
Advanced DeFi Scrutiny	Kill-Switch Mechanism	
	Operation Trails & Event Generation	
	ERC20 Idiosyncrasies Handling	
	Frontend-Contract Integration	
	Deployment Consistency	
	Holistic Risk Management	
	Avoiding Use of Variadic Byte Array	
	Using Fixed Compiler Version	
Additional Recommendations	Making Visibility Level Explicit	
	Making Type Inference Explicit	
	Adhering To Function Declaration Strictly	
	Following Other Best Practices	



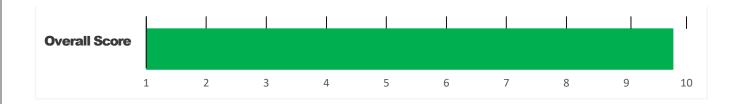


EXECUTIVE SUMMARY

Vital Block Security has performed the automated and manual analysis of the PANDIANAONSOL Rust code. The code was reviewed for common contract vulnerabilities and centralized exploits. Here's a quick audit summary:

Status	Critical !	Major "	Medium #	Minor 🐀	Unknown 🌑
Open	0	0	1	0	0
Acknowledged	0	0	0	1	2
Resolved	0	0	0	0	0
Noteworthy OnlyOwner Privileges Set Taxes and Ratios, Airdrop, Set Protection Settings, Set Reward Properties, Set Reflector Settings, Set Swap Settings, Set Pair and Router					rd Properties,

PANDIANAONSOL Smart contract has achieved the following score: 98.0



- Please note that smart contracts deployed on blockchains aren't resistant to exploits, vulnerabilities and/or hacks. Blockchain and cryptography assets utilize new and emerging technologies. These technologies present a high level of ongoing risks. For a detailed understanding of risk severity, source code vulnerability, and audit limitations, kindly review the audit report thoroughly.
- Please note that centralization privileges regardless of their inherited risk status constitute an elevated impact on smart contract safety and security.





AUDIT METHODOLOGY

Smart contract audits are conducted using a set of standards and procedures. Mutual collaboration is essential to performing an effective smart contract audit. Here's a brief overview of Vital Block

Security auditing process and methodology:

CONNECT

 The onboarding team gathers source codes, and specifications to make sure we understand the size, and scope of the smart contract audit.

AUDIT

- Automated analysis is performed to identify common contract vulnerabilities. We may use the following third-party frameworks and dependencies to perform the automated analysis:
 - Remix IDE Developer Tool
 - Open Zeppelin Code Analyzer
 - SWC Vulnerabilities Registry
 - DEX Dependencies, e.g., Pancakeswap, Uniswap
- Simulations are performed to identify centralized exploits causing contract and/or trade locks.
- A manual line-by-line analysis is performed to identify contract issues and centralized privileges.
 We may inspect below mentioned common contract vulnerabilities, and centralized exploits:

	 Token Supply Manipulation
Centralized Exploits	 Access Control and Authorization
	o Assets Manipulation
	 Ownership Control
	o Liquidity Access
	 Stop and Pause Trading
	 Ownable Library Verification





Lack of Arbitrary limits

Integer Overflow

Incorrect Inheritance Order

Typographical Errors

Requirement Violation

Gas Optimization

Coding Style Violations

Re-entrancy

Third-Party Dependencies

Potential Sandwich Attacks

Irrelevant Codes

Divide before multiply

Conformance to Solidity Naming Guides

Compiler Specific Warnings

Language Specific Warnings

REPORT

Common Contract Vulnerabilities

- The auditing team provides a preliminary report specifying all the checks which have been performed and the findings thereof.
- o The client's development team reviews the report and makes amendments to the codes.
- The auditing team provides the final comprehensive report with open and unresolved issues.

PUBLISH

- o The client may use the audit report internally or disclose it publicly.
- It is important to note that there is no pass or fail in the audit, it is recommended to view the audit as an unbiased assessment of the safety of solidity codes.





RISK CATEGORIES

Smart contracts are generally designed to hold, approve, and transfer tokens. This makes them very tempting attack targets. A successful external attack may allow the external attacker to directly exploit. A successful centralization-related exploit may allow the privileged role to directly exploit. All risks which are identified in the audit report are categorized here for the reader to review:

Risk Type	Definition
Critical	These risks could be exploited easily and can lead to asset loss, data loss, asset, or data manipulation. They should be fixed right away.
Major —	These risks are hard to exploit but very important to fix, they carry an elevated risk of smart contract manipulation, which can lead to high-risk severity.
	These risks should be fixed, as they carry an inherent risk of future exploits, and
Medium •	hacks which may or may not impact the smart contract execution. Low-risk re- entrancy-related vulnerabilities should be fixed to deterexploits.
Minor •	These risks do not pose a considerable risk to the contract or those who interact with it. They are code-style violations and deviations from standard practices. They should be highlighted and fixed nonetheless.
Unknown	These risks pose uncertain severity to the contract or those who interact with it. They should be fixed immediately to mitigate the riskuncertainty.

All statuses which are identified in the audit report are categorized here for the reader to review:

Status Type	Definition
Open	Risks are open.
Acknowledged	Risks are acknowledged, but not fixed.
Resolved	Risks are acknowledged and fixed.





CENTRALIZED PRIVILEGES

Centralization risk is the most common cause of cryptography asset loss. When a smart contract has a privileged role, the risk related to centralization is elevated.

There are some well-intended reasons have privileged roles, such as:

- o Privileged roles can be granted the power to pause()the contract in case of an external attack.
- Privileged roles can use functions like, include(), and exclude() to add or remove wallets from fees,
 swap checks, and transaction limits. This is useful to run a presale and to list on an exchange.

Authorizing privileged roles to externally-owned-account (EOA) is dangerous. Lately, centralization-related losses are increasing in frequency and magnitude.

- The client can lower centralization-related risks by implementing below mentioned practices:
- Privileged role's private key must be carefully secured to avoid any potential hack.
- Privileged role should be shared by multi-signature (multi-sig) wallets.
- Authorized privilege can be locked in a contract, user voting, or community DAO can be introduced to unlock the privilege.
- o Renouncing the contract ownership, and privileged roles.
- Remove functions with elevated centralization risk.
- Understand the project's initial asset distribution. Assets in the liquidity pair should be locked.
 Assets outside the liquidity pair should be locked with a release schedule.





Key Findings

Overall, these contracts are well-designed and engineered, though the implementation can be improved by resolving the identified issues (shown in Table 2.1), 0 medium-severity vulnerabilities, 3 low-severity vulnerabilities, and 1 informational recommen-dations.

Table 2.1: Key PANDIANAONSOL Audit Findings

ID	Severity	Title	Category	Status
PAN-01	Informational	In updateForMinter, the following equation is used inside an unchecked block	Status Mathematical Operations	Acknowledged

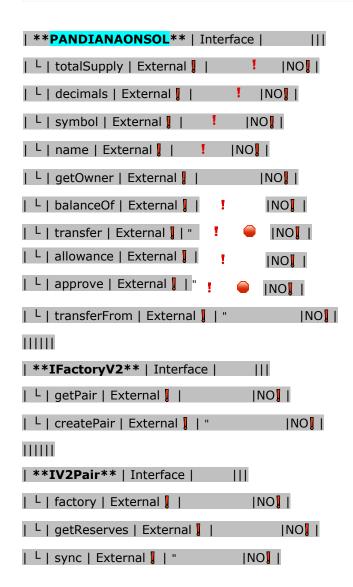
Beside the identified issues, we emphasize that for any user-facing applications and services, it is always important to develop necessary risk-control mechanisms and make contingency plans, which may need to be exercised before the mainnet deployment. The risk-control mechanisms should kick in at the very moment when the contracts are being deployed on mainnet. Please refer to page 10 for details...





AUTOMATED ANALYSIS

Symbol	Definition
<u> </u>	Function modifies state
#	Function is payable
Şì	Function is internal
%	Function is private
1	Function is important







```
\Pi\Pi\Pi\Pi
| **IRouter01** | Interface | | | | | |
| L | factory | External | | NO | |
| L | Sol| External | | NO | |
| L | addLiquiditySOL| External | | # |NO| |
| L | addLiquidity | External | | " | NO | |
| L | swapExactSOLorTokens | External | | # |NO| |
| L | getAmountsOut | External | | NO | |
| L | getAmountsIn | External | NO | |
111111
| **IRouter02** | Interface | IRouter01 |||
L | swapExactTokensForSOLSupportingFeeOnTransferTokens | External | | "
                                                                              INO!
L | swapExactSOLForTokensSupportingFeeOnTransferTokens | External | | # | NO | |
| L | swapExactTokensForTokensSupportingFeeOnTransferTokens | External | | "
                                                                             ■ INOI I
| L | swapExactTokensForTokens | External | | " | NO | |
| **Protections** | Interface | | | |
| L | checkUser | External | | "
      | L | setLaunch | External | | " | NO | |
| L | setLpPair
                    | External | | " | | | | | | | |
| L | PNDA
                     | External | | " | NO | |
| L | removeSniper | External | | " | NO | |
\Pi\Pi\Pi\Pi
| **Cashier** | Interface | | | |
| L | setRewardsProperties | External | | "
                                               INOLI
| L | tally
            | External | | " | NO | |
| L | load
           | External | | # |NO | | | |
| L | cashout | External | | " | NO | |
| L | giveMeWelfarePlease | External | | " | NO | |
| L | getTotalDistributed | External | | NO | |
| L | getUserInfo | External | | NO | |
| L | getUserRealizedRewards | External | |
                                                INO
```





```
| L | getPendingRewards | External | | NO | | |
| L | initialize | External | | " | NO | |
| L | getCurrentReward | External | | NO | |
\Pi\Pi\Pi\Pi
| **RUST** | Implementation | RUST ||| | |
| L | <Constructor> | Public | | # |NO| |
| L | transferOwner | External | | " | onlyOwner |
| L | renounceOwnership | External | | " | NO!
| L | setOperator | Public | | " | NO | |
| L | renounceOriginalDeployer | External | | "
                                                INOLI
| L | <Receive SOL> | External | | # |NO| |
| L | totalSupply | External | | NO! |
| L | decimals | External | | NO | |
| L | symbol | External | | NO| |
| L | name | External | | NO | |
                               INO!
| L | getOwner | External | |
                              INOI
| L | balanceOf | Public | |
                                INO
| L | allowance | External | |
                            INOI I
| L | approve | External | | "
| L | approve | Internal $ | " 🔒
| L | transfer | External | | " | NO | | | | | | | |
| L | transferFrom | External | | " | NO | |
| L | setNewRouter | External | | " | onlyOwner |
| L | setLpPair | External | | " | onlyOwner |
| L | setInitializers | External | | " | onlyOwner |
| L | isExcludedFromFees | External | | NO | |
| L | isExcludedFromDividends | External | | | | | | | | | | |
| L | isExcludedFromProtection | External | NO |
                        | Public | | " | onlyOwner |
| L | setDividendExcluded
| L | setExcludedFromFees
                        | Public | | " | onlyOwner |
```





PAN-01 POSSIBLE OVERFLOW

Category	Severity •	Location	Status
Status Mathematical Operations	Minor	Contract/code/PANDIANAONSOL/	Acknowledged

Description

In **updateForMinter**, the following equation is used inside an unchecked block

```
key:4
updateAuthority:"PNDAJ9KLDSbgtckPZAgtfATCnjv6Tis6DeMhJGtRa7s"
mint:"PNDAhF2ChmBqNFyGXwLEvo5A8Am5ASFcYZ5X59sND12"
data:{4 items
name:"Pandiana"
symbol:"PNDA"
uri:"https://arweave.net/7t0jrDKycGtwvg-9zcjgMFaH5qk3_E2qX-DHU_Np3gI"
sellerFeeBasisPoints:0
}
```

Minter can not issue more **PANDIANAONSOL** tokens indefinitely.

Note that as of the date of publishing, the above review reflects the current understanding of known security patterns as they relate to the **PNDA** contract.

Recommendation

We recommend either checking for overflow in this case, or ensuring that the PairsIn is close enough it will never cause an overflow.





OPTIMIZATIONS | PANDIANAONSOL

ID	Title	Category	Status
FTV	Logarithm Refinement Optimization	Gas Optimization	Acknowledged
FOP	Checks Can Be Performed Earlier	Gas Optimization	Acknowledged •
FDP	Unnecessary Use Of SafeRust	Gas Optimization	Acknowledged •
FWY	Struct Optimization	Gas Optimization	Acknowledged •
FGT	Unused State Variable	Gas Optimization	Acknowledged •





General Detectors

🕕 Missing Zero Address Validation

Some functions in this contract may not appropriately check for zero addresses being used.

Attention Required

Public Functions Should be Declared Externa

Some functions in this contract should be declared as external in order to save gas.



- No compiler version inconsistencies found
- No unchecked call responses found
- No vulnerable self-destruct functions found
- No assertion vulnerabilities found
- No old solidity code found
- No external delegated calls found
- ✓ No external call dependency found
- No vulnerable authentication calls found
- No invalid character typos found
- No RTL characters found
- No dead code found
- No risky data allocation found
- No uninitialized state variables found
- No uninitialized storage variables found
- No vulnerable initialization functions found
- No risky data handling found
- No number accuracy bug found
- No out-of-range number vulnerability found
- ✓ No map data deletion vulnerabilities found

- No tautologies or contradictions found
- No faulty true/false values found
- No innacurate divisions found
- No redundant constructor calls found
- No vulnerable transfers found
- No vulnerable return values found
- No uninitialized local variables found
- No default function responses found
- No missing arithmetic events found
- No missing access control events found
- No redundant true/false comparisons found
- No state variables vulnerable through function calls found
- No buggy low-level calls found
- No expensive loops found
- No bad numeric notation practices found
- ✓ No missing constant declarations found
- No missing external function declarations found
- No vulnerable payable functions found
- No vulnerable message values found





Vulnerability Scan

REENTRANCY

✓ No reentrancy risk found

Severity Minor

Confidence Parameter Certain

Vulnerability Description

Not Mintable: A large amount of this token can not be minted by a private wallet or contract.

Scanning Line:

"name":string"Pandiana"
"symbol":string"PNDA"
"uri":string"https://arweave.net/7t0jrDKycGtwvg9zcjgMFaH5qk3_E2qX-DHU_Np3gI





Contract Owner Address:

https://solscan.io/token/PNDAhF2ChmBqNFyGXwLEvo5A8Am5ASFcYZ5X59sND12

Audited Files

PANDIANAONSOL.RUST

Contracts:

Contract:

SOLNARIZE: PNDAhF2ChmBqNFyGXwLEvo5A8Am5ASFcYZ5X59sND12

Mint Address:

Address

4INTER:PNDAJ9KLDSbgtckPZAgtfATCnjv6Tis6DeMhJGtRa7s



Vulnerability Run check

Risk Analysis

Contract source code verified

This token contract is open source. You can check the contract code for details. Unsourced token contracts are likely to have malicious functions to defraud their users of their assets.

No mint function

Mint function is transparent or non-existent. Hidden mint functions may increase the amount of tokens in circulation and effect the price of the token.

Owner cant change balance

The contract owner does not have the authority to modify the balance of tokens at other addresses.

Honeypot Risk

This does not appear to be a honeypot

We are not aware of any code that prevents the sale of tokens.

O No Anti Whale

There is no limit to the number of token transactions. The number of scam token transactions may be limited (honeypot risk).

No whitelist function

Whitelist function found

O No Proxy

There is no proxy in the contract. The proxy contract means contract owner can modify the function of the token and possibly effect the price.

No function to retrieve ownership

If this function exists, it is possible for the project owner to regain ownership even after relinquishing it.



No trading cooldown

The token contract has no trading cooldown function. If there is a trading cooldown function, the user will not be able to sell the token within a certain time or block after buying.

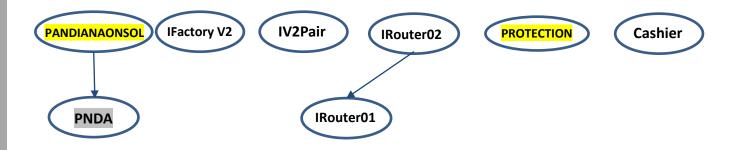
No blacklist function

No blacklist function is included.





INHERITANCE GRAPH



Identifier	Definition	Severity
CEN-12	Centralization privileges of PANDIANAONSOL	Medium # 🛑

Vulnerability 0 : No important security issue detected.

Threat level: Low





MANUAL REVIEW

PANDIANAONSOL: the next big wave in the world of play-to-earn gaming. We're not just another memecoin but a revolution in the blockchain gaming arena, built on Solana for unmatched speed and efficiency.

TOKEN NAME: PANDIANAONSOL

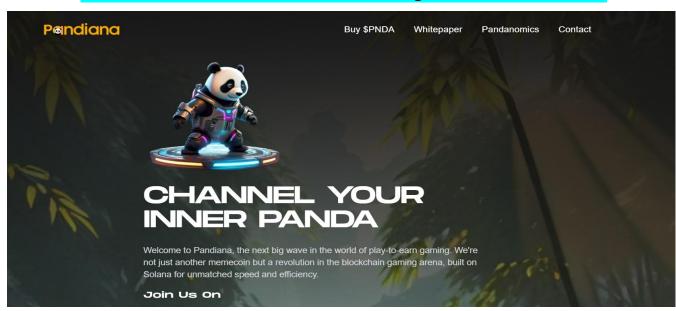
Ticker: PNDA

Chain/Standard: Solana Network

LAUNGUGE: Rust



The PANDIANAONSOL Platform Is Launching On the Solana Network









issues checking status

Issue Description Checking Status

1.	Compiler errors.	PASSED
2.	Race Conditions and reentrancy. Cross-Function Race Conditions.	PASSED
3.	Possible Delay In Data Delivery.	PASSED
4.	Oracle calls.	PASSED
5.	Front Running.	PASSED
6.	Rust Dependency.	PASSED
7.	Integer Overflow And Underflow.	PASSED
8.	DoS with Revert.	PASSED
9.	Dos With Block Gas Limit.	PASSED
10.	Methods execution permissions.	PASSED
11.	Economy Model of the contract.	PASSED
12.	The Impact Of Exchange Rate On the sol Logic.	PASSED
13.	Private use data leaks.	PASSED
14.	Malicious Event log.	PASSED
15.	Scoping and Declarations.	PASSED
16.	Uninitialized storage pointers.	PASSED
17.	Arithmetic accuracy.	PASSED
18.	Design Logic.	PASSED
19.	Cross-Function race Conditions	PASSED
20.	Save Upon Move contract Implementation and Usage.	PASSED
21.	Fallback Function Security	PASSED







Identifier	Definition	Severity
CEN-02	Initial asset distribution	Minor 🌑

All of the initially minted assets are sent to the contract deployer when deploying the contract. This can be an issue as the deployer and/or contract owner can distribute tokens without consulting the community.

"data":{5 items
"name":string"Pandiana"
"symbol":string"PNDA"
"uri":string"https://arweave.net/7t0jrDKycGtwvg-9zcjgMFaH5qk3_E2qX-DHU_Np3gI"
"sellerFeeBasisPoints":int0
"creators":undefined
}

RECOMMENDATION

Project stakeholders should be consulted during the initial asset distribution process.





RECOMMENDATION

Deployer and/or contract owner private keys are secured carefully.

Please refer to PAGE-09 CENTRALIZED PRIVILEGES for a detailed understanding.

ALLEVIATION

The PANDIANAONSOL project team understands the centralization risk. Some functions are provided privileged access to ensure a good runtime behavior in the project





Identifier	Definition	Severity
COD-10	Third Party Dependencies	Minor 🏐

Smart contract is interacting with third party protocols e.g., Pancakeswap router, cashier contract, protections contract. The scope of the audit treats third party entities as black boxes and assumes their functional correctness. However, in the real world, third parties can be compromised, and exploited. Moreover, upgrades in third parties can create severe impacts, e.g., increased transactional fees, deprecation of previous routers, etc.

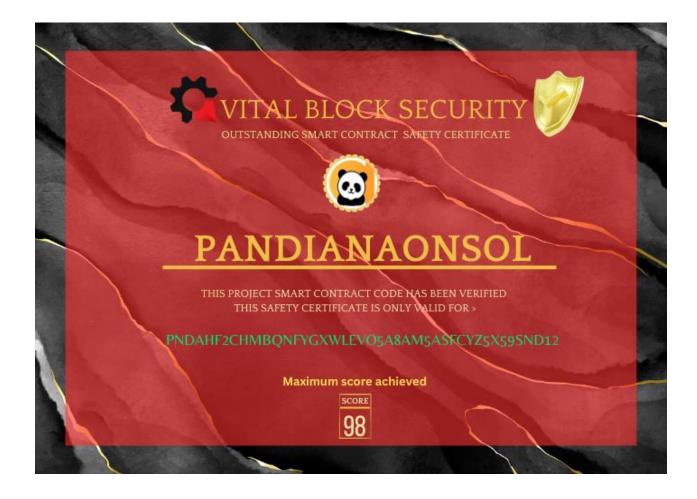
RECOMMENDATION

Inspect and validate third party dependencies regularly, and mitigate severe impacts whenever necessary.





CERTIFICATE BY VITAL BLOCK SECURITY









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Vital Block provides the easy-to-understand audit of Solidity, Move and Raw source codes (commonly known as smart contracts).

The smart contract for this particular audit was analyzed for common contract vulnerabilities, and centralization exploits. This audit report makes no statements or warranties on the security of the code. This audit report does not provide any warranty or guarantee regarding the absolute bug-free nature of the smart contract analyzed, nor do they provide any indication of the client's business, business model or legal compliance. This audit report does not extend to the compiler layer, any other areas beyond the programming language, or other programming aspects that could present security risks. Cryptographic tokens are emergent technologies, they carry high levels of technical risks and uncertainty. You agree that your access and/or use, including but not limited to any services, reports, and materials, will be at your sole risk on an as-is, where-is, and as-available basis. This audit report could include false positives, false negatives, and other unpredictable results.

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ABOUT VITAL BLOCK

Vital Block provides intelligent blockchain Security Solutions. We provide solidity and Raw Code Review, testing, and auditing services. We have Partnered with 15+ Crypto Launchpads, audited 50+ smart contracts, and analyzed 200,000+ code lines. We have worked on major public blockchains e.g., Ethereum, Binance, Cronos, Doge, Polygon, Avalanche, Metis, Fantom, Bitcoin Cash, Aptos, Oasis, etc.

Vital Block is Dedicated to Making Defi & Web3 A Safer Place. We are Powered by Security engineers, developers, Ul experts, and blockchain enthusiasts. Our team currently consists of 5 core members, and 4+ casual contributors.

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