Vision Statement

以綠色半導體技術豐富人類生活的隱形冠軍

Be a hidden champion in providing sustainable semiconductors to enrich human life.
Winbond introduced the first certified Secure Flash to protect connected devices across several markets.

**Automotive**
- GPS
- Wi-Fi
- Cloud

**Industry 4.0**
- Sensors
- Robots
- Servers

**IoT**
- Smart Camera
- Smart Door Locks
- Home Energy Console
A Leading Specialty & Secure Memory Supplier

A heavy investment on security infrastructure and technology

All manufacturing sites are certified for Common Criteria EAL 5+ products

Active participation in standard bodies and security forums
Winbond’s W75F Secure Flash Solution is the first secure flash memory device to gain a Common Criteria (CC) EAL5+ certificate. It can be used for secure eXecute-in-Place (XiP) and can protect the confidentiality and integrity of code and data in IoT devices, integrated UICC, integrated Secure Element, Artificial Intelligence (AI) platforms, integrated Hardware Security Modules (HSM) for automotive subsystems. The W75F provides the industry’s most secure external storage for code and data. It offers a dependable solution for manufacturers of connected devices who want to defend their products against threats such as replay, roll-back, man-in-the-middle, sniffing, side-channel attack and fault injection attack.
The world’s first Secure Flash device, Common Criteria EAL5+ certified
Bolt-on security for IoT, Automotive and Artificial Intelligence (AI) platforms
Complementary solution for Arm®v8-M and Arm®v8-A TEE sub-system
In-band integrity check protects the interface
Flexible secure memory architecture

<table>
<thead>
<tr>
<th>Flash Density</th>
<th>Product Series</th>
<th>Voltage</th>
<th>Certificate</th>
<th>Feature</th>
<th>Package</th>
</tr>
</thead>
</table>
| 4M bit        | W75F           | 1.65-1.95V | CC EAL 5+   | • Secure eXecute-in-Place (XiP)  
• Tamper and SCA/DPA Resistant  
• Code and Data Confidentiality and Integrity  
• Mutual Authentication with SoC  
• Secure SPI Quad/Octal Interface  
• Shared Memory Architecture for Multiple-Domains  
• AEC-Q100 with AG2 Qualification Available or Upon Request  
• 21 MByte/sec Secured and Authenticated Throughput  
• 100,000 Program/Erase Cycles  
• 20-year Data Retention  
• Temperature Range: -40°C to 105°C | WQFN32  
5x5mm  
WLCSP |
| 16M bit       |                |         |             |         |         |
| 32M bit       |                |         |             |         |         |

KGD
We also offer KGD (Known Good Die) products. For further information please contact: TrustME@winbond.com
Winbond TrustME® W76S Secure Element/eUICC Solution

Winbond W76S secure element is an innovative solution which includes 4MB Secure Flash whose memory size can be scaled to meet designers' requirement. W76S comes with Arm® SecurCore™, SC000™ 32-bit RISC with a core clock up to 100MHz and Memory Protection Unit (MPU). Various coprocessors, crypto, such as 3DES, AES 128/192/256, RSA-2048/4096, and ECC 521, True RNG and side-channel attacks (SCA) DPA are used in W76S to advance the security features. W76S has passed Common Criteria EAL5+, EMVCo and CFNR (China Financial National Rising Authentication) certification. It can also be used for the embedded UICC (eUICC) application, supporting multi-profiles, remote provisioning, at the same time, save footprint on the PCB. The eUICC will bring benefit to the growth and enhances operational efficiency of the M2M ecosystem.
Premium Content Protection
- Usage of individual secret key per title
- Limiting number of playbacks/shares

Internet of things (IoT)

Secure Boot
- Protect boot code from modifications
- Secure execution storage vs. Root-of-Trust e.g. TPM

Winbond TrustME®

Electronic Wallet
- Mobile payment
- Software secure solution

Support AG2 (Automotive)

Biometric Information Authenticity
- Fingerprint storage

GSMA Remote Provisioning
- Support OTA technology to lower international roaming switching cost between countries
- GlobalPlatform UICC Card Architecture
- 32-bit CPU based on the Arm® SecurCore™ SC000™
Secure Element
Embedded flash

Secure Element
SFI

Flash

Patented Secure Link

Winbond’s Patented Architecture

Uniquely Paired Secure Controller and Secure Flash Memory
- Added digital logic to flash device to protect secure flash interface and create secure link between integrated IP and flash
- Flash device from Winbond as a security companion device

Cost Effective, Two Separate Devices
- Standard flash memory process
- Standard CMOS process for the controller

Scalable Large Flash Density to Enable Application Innovation

<table>
<thead>
<tr>
<th>Flash Density</th>
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<th>Voltage</th>
<th>Clock (MHz)</th>
<th>Feature</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>2M Byte</td>
<td>W76S</td>
<td>1.65-3.6V</td>
<td>100</td>
<td>• 32-bit CPU based on Arm® SecurCore™ SC000™ Core&lt;br&gt;• 32KB RAM&lt;br&gt;• 2MB/4MB Secure Flash&lt;br&gt;• Compatible with Java Card Specification 3.x&lt;br&gt;• Crypto Accelerators for 3DES, AES, RSA, ECC, SHA, TRNG&lt;br&gt;• GSMA Remote Provisioning Specifications Compliant&lt;br&gt;• GlobalPlatform UICC Card Architecture Support&lt;br&gt;• AG2 Support&lt;br&gt;• SWP, SPI, ISO 7816, I2C, GPIOs&lt;br&gt;• Temperature Range: -40°C to 105°C&lt;br&gt;• CC EAL5+ Certificate&lt;br&gt;• EMVCo Approval&lt;br&gt;• CFNR Certificate</td>
<td>WQFN32 5x5 mm&lt;br&gt;WSON12 4x4.2 mm&lt;br&gt;SON8(MFF2) 6x5mm&lt;br&gt;WSON8 4x4.2 mm</td>
</tr>
<tr>
<td>4M Byte</td>
<td></td>
<td></td>
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</table>

Contact us: TrustME@winbond.com
Winbond TrustME® W77Q Secure Flash

SpiNOR Flash Compatible Memory Enabling Comprehensive, End-to-End Security

W77Q series of Secure Flash memory devices is a drop-in replacement for standard flash devices. It supports secure boot and system level resilience, and provides strong protection for operations such as over-the-air updates and device authentication. The new W77Q enables hardware root-of-trust and secure, encrypted data-storage and transfer capabilities. It ensures robust and secure over-the-air updates with end-to-end secure channel between the updating authority and the IoT device equipped with W77Q, even when the host processor is compromised.

<table>
<thead>
<tr>
<th>Flash Density</th>
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<th>Voltage</th>
<th>Clock (MHz)</th>
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</tr>
</thead>
</table>
| 32 Mbit       | W77Q           | 1.65-1.95V | 66MHz at Double Transfer Rate/133MHz at Single Transfer Rate | • Hardware-based Root-of-Trust engine  
• Device attestation  
• Cryptographically secured write protection  
• Secure code updates with anti-rollback  
• Secure boot from Flash (Root-of-Trust) with fast execution  
• Secure eXecute-in-Place (XiP) of boot and application code  
• Authenticated watchdog timer  
• Authenticated and encrypted data transfer between the Flash and the host  
• Secure over-the-air update with end-to-end secure channel between the updating authority and W77Q even when the host processor is compromised  
• Secure interface: § Replay Protection Monotonic Counter (RPMC)  
§ Incremental security  
§ In-field fail safe configuration update  
§ Secure symmetric key management  
§ Secure unique device ID  
• 20-year data retention  
• 100,000 program/erase cycles  
• Operating temperature range of -40°C to 105°C | SOP16 (300-mil)  
WSON8 (6x5)  
24-ball TFBGA |

1. For other package and density, please contact: TrustME@winbond.com

KGD

We also offer KGD (Known Good Die) products. For further information please contact: TrustME@winbond.com
100% electrical and functional drop-in replacement for standard serial flash
Fast integration path with no need to redesign board or SoC

Secure over-the-air update support
Advanced security features
Automatic code and data authentication and fallback

Secure storage and advanced security functions
ARCHITECTURE OVERVIEW

Root-of-Trust Secure Flash Memory
• Self code integrity check and secure boot
• Hacking detection
• System recovery (Resilience)

3rd Party Certified and Trusted Memory
• CC/EAL2 (in progress)
• SESIP (in progress)

End-to-End Security Architecture
• Even with unsecure or compromised host processor
• Secure firmware over-the-air update
• Remote memory configuration for high / substantial / basic security demand

Drop in Replacement
• Compatible with standard flash memory
• Enables incremental security
Conduct business with integrity and ethical behavior | Accountable team work | Enthusiasm of learning | Aggressively innovate | Sustainable contribution
Business Benefits

- Drop-in replacement for standard flash
- Fast-time-to-market product development
- System resilience with protection, detection and recovery

![IoT diagram with various smart home devices: Smart Meter, LED Lights, Smart Camera, Smart door locks, Home Energy Console, Solar panel, Coffee Machine, Robot Cleaner, Home battery, Smart speaker, Refrigerator, Washer.](image)
Winbond’s Portfolio Addresses All Levels of Resilience And Protection

W75F and W77Q can satisfy the composition certification scheme to save customer’s effort and expedite time-to-market.

<table>
<thead>
<tr>
<th>Security Level</th>
<th>W75F</th>
<th>W77Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>• CC$^1$ certificate EAL5+</td>
<td>• CC$^1$ certificate EAL2 (in progress)</td>
</tr>
<tr>
<td></td>
<td>• SESIP$^2$ (in progress)</td>
<td>• SESIP$^2$ (in progress)</td>
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<tr>
<td></td>
<td>• EMVCo</td>
<td>Security by design for EU</td>
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<tr>
<td></td>
<td>• ARM PSA$^3$ L1/L2</td>
<td>Cybersecurity Act$^4$, GDPR$^5$</td>
</tr>
<tr>
<td></td>
<td>• Security by design for EU</td>
<td>• Mobile Payment, iSIM</td>
</tr>
<tr>
<td></td>
<td>Cybersecurity Act$^4$, GDPR$^5$</td>
<td>• V2X, Telematics, ADAS, Autonomous Driving, Fusion ECU, Car Key</td>
</tr>
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<td></td>
<td>• Wearable</td>
<td>Cloud &amp; Server</td>
</tr>
<tr>
<td></td>
<td>• Smartphone</td>
<td>• Government, Military, Medical, Aerospace</td>
</tr>
<tr>
<td></td>
<td>• Tablet</td>
<td>• Secure XP</td>
</tr>
<tr>
<td></td>
<td>• Desktop &amp; Laptop</td>
<td>• IoT (High)</td>
</tr>
<tr>
<td></td>
<td>• Drone</td>
<td>Security is a “MUST” for the safety of</td>
</tr>
<tr>
<td></td>
<td>• Infotainment, Cluster, ECU</td>
<td>• Personal Privacy</td>
</tr>
<tr>
<td></td>
<td>• Industrial, Automation</td>
<td>• Financial Transactions</td>
</tr>
<tr>
<td></td>
<td>• IoT (Substantial-Basic)</td>
<td>• Cyber World</td>
</tr>
</tbody>
</table>

1. Common Criteria (CC) for Information Technology Security Evaluation
3. Arm’s Platform Security Architecture
4. The EU Cybersecurity Act establishes an EU-wide cybersecurity certification framework for digital products, services and processes.
5. The General Data Protection Regulation (EU) 2016/679 (GDPR)
WORLDWIDE SALES OFFICE

Winbond Electronics Corporation -CTSP Site
No. 8, Keya 1st Rd., Daya Dist.,
Central Taiwan Science Park,
Taichung City 42881, Taiwan
Tel : 886-4-2921-8168

Jhubei Office
No. 539, Sec. 2, Wenxing Rd., Jhubei City,
Hsinchu County 30274, Taiwan
Tel : 866-3-567-8168

Taipei Office
2F., No.192, Jingye 1st Rd., Zhongshan Dist.,
Taipei City 10462, Taiwan
Tel : 886-2-8177-7168

Winbond Electronics Corporation America
2727 North First St., San Jose,
CA 95134, U.S.A.
Tel : 1-408-943-6666

Winbond Electronics (Suzhou) Limited
Room 1206, Kingboard Plaza (Building B, 12 floor),
No.505, Guangming Road, Huaqiao Town,
Kunshan City, Jiangsu Province, China
Tel : 86-512-8163-8168

Winbond Electronics (Suzhou) Limited
-Shenzhen Branch office
8F Microprofit Building, Gaoxinnan 6 Road,
High-Tech Industrial Park,
Nanshan Dist. Shenzhen, P.R. China
Tel : 86-755-3301-9858

Winbond Electronics (H.K.)Limited
Unit 9-11, 22F, Millennium City 2,
378 Kwan Tong Road, Kowloon, Hong Kong
Tel : 852-2751-3126

Winbond Electronics Corporation Japan
Shin-Yokohama Square Bldg., 9F 2-3-12 Shin-Yokohama,
Kouhoku-ku, Yokohama, kanagawa 222-0033, Japan
Tel : 81-45-478-1801

www.winbond.com