

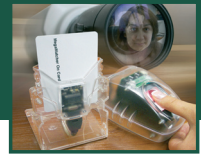


**NEUROtechnology**



Smart card  
multi-biometrics

**MegaMatcher On Card SDK**



# MegaMatcher On Card SDK

## Smart card multi-biometrics

Document updated on April 11, 2012

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MegaMatcher On Card SDK offers matching-on-card technology that stores a person's fingerprint, iris and face templates on a smart card and **performs template matching in a microprocessor embedded in the card** instead of matching biometric information on a PC processor. This method ensures that personal biometric information does not transfer to an external computer as it would in a more basic template-on-card system.

MegaMatcher On Card SDK is developed utilizing a set of ISO/IEC standards to enable interoperability with and easy integration into existing smart card and/or biometric systems.

- PC-like verification accuracy
- Configurable verification modes
- Multi-biometrics support
- Security and privacy
- ISO/IEC standards support
- Easy integration with existing systems
- Different smart card platforms supported



## Algorithm Features and Capabilities

MegaMatcher On Card 3.1 is based on MegaMatcher multi-biometric AFIS technology and provides a number of advantages over a standard fingerprint / face / iris identification system or similar products for smart cards, including:

- **Accuracy.** MegaMatcher On Card provides the same level of accuracy of an AFIS (automated fingerprint identification system) in a verification process using ISO/IEC 19794-2 compact card minutiae format templates together with the security of storage of biometric templates and matching algorithm on a smart card. Face and iris modalities on-card verification precision conforms to the large scale multi-biometric MegaMatcher SDK accuracy rates of Neurotechnology's compact format templates matching. See the reliability testing results that compare MegaMatcher On Card with MegaMatcher 4.3.
- **Configurability.** MegaMatcher On Card fingerprint algorithm has different performance configurations that can be chosen according to the operating scenario, the requirements to matching accuracy, the smart card platform speed and memory constraints.
- **Multibiometrics.** The face and iris matching engines can be used as an additional or alternative factor of authentication that enhances the fingerprint verification. Fingerprint, iris and face templates can be stored on a single card together with the fingerprint, iris and face matching algorithms.



## MegaMatcher On Card 3.1 SDK Contents

MegaMatcher On Card 3.1 SDK provides a number of advantages over a standard fingerprint / iris / face identification system or similar products for smart cards, including:

- **ISO/IEC standards support.** MegaMatcher On Card 3.1 SDK is compliant with the following standards:
  - ISO/IEC 7816-3
  - ISO/IEC 7816-4
  - ISO/IEC 7816-9
  - ISO/IEC 7816-11
  - ISO/IEC 19794-2 (compact size finger minutiae card format)
- **Easy integration.** Implementing the system will not require major overhauls of existing infrastructure, as MegaMatcher On Card SDK is developed utilizing a set of ISO/IEC standards to enable interoperability with and easy integration into existing smart card and/or biometric systems. The process of fingerprint, iris and face enrollment during the card issuance, often connected to the avoidance of emission of duplicates, can also be developed with VeriFinger, VeriEye, VeriLook or MegaMatcher components that are fully compatible with MegaMatcher On Card. This provides the advantages of both using the whole set of features of Neurotechnology proprietary templates format to improve the accuracy of duplicates searching and the possibility to ensure the quality of the biometric data stored into the card.
- **Cost effectiveness.** A biometric system that uses matching on card can be developed including the fingerprint, iris and face extractor components of MegaMatcher On Card. Those have most of the same algorithm functionalities of MegaMatcher, and they are specifically designed to produce the template formats used by the cards. This gives a cost-effective solution to both integrators who want to test MegaMatcher On Card technology without the necessity of purchasing any additional component, and to the ones who needs to replicate the client part of their matching on card based product on a relevant number of terminals, like the case of a Logon service.
- **Different smartcard platforms supported.** MegaMatcher On Card can be integrated at different stages of the card life cycle for various smart cards platforms. The post-issuance library gives the possibility to rapidly integrate matching on card in projects where time constraints are critical. On the other hand the possibility to store the code directly into the ROM mask and the partnership with several card vendors offer a faster matching on card solution and the possibility to maintain more EEPROM available for post-issuance applications.
- **Security.** Biometric verification can replace or be combined with less secure (e.g., PIN) authentication techniques to achieve higher security.
- **Privacy.** The original template remains on the smart card, providing a safeguard against misuse of information or fraudulent scanning systems.

The table on the next page lists the components of MegaMatcher On Card 3.1 SDK:



Components	Windows (32 & 64 bit)	Linux (32 bit only)	JavaCard OS
• Smart card with fingerprint matching engine			2 smart cards
• Smart card with multi-modal fingerprint, face and iris matching engine			1 smart card
• MegaMatcher On Card Fingerprint Extractor	2 single computer licenses		
• MegaMatcher On Card Face Extractor	1 single computer license		
• MegaMatcher On Card Iris Extractor	1 single computer license		
• Library for communication with a smart card	+	+	
• Device Manager library	+	+	
<b>Programming samples</b>			
• C#	+		
• Visual Basic .NET	+		
• Sun Java 2	+	+	
• JavaCard (enrollment and verification applets)			+
<b>Programming tutorials</b>			
• C	+	+	
• C#	+		
• Visual Basic .NET	+		
• Sun Java 2	+	+	
• JDKv2.2.2 apdtool	+		
• NXP JCOP tools JCSHELL	+		
<b>Documentation</b>			
• MegaMatcher On Card SDK documentation		+	

## MegaMatcher On Card fingerprint matching engine

MegaMatcher On Card 3.1 fingerprint matching engine performs fingerprint template matching in 1-to-1 mode (verification). Being based on the MegaMatcher technology, the engine is tolerant to fingerprint rotations, translations and deformations.

## MegaMatcher On Card face matching engine

MegaMatcher On Card 3.1 face matching engine performs face template matching in 1-to-1 mode (verification).

## MegaMatcher On Card iris matching engine

MegaMatcher On Card 3.1 iris matching engine performs iris template matching in 1-to-1 mode (verification).

## MegaMatcher On Card Fingerprint Extractor component

MegaMatcher On Card 3.1 Fingerprint Extractor creates ISO 19794-2 fingerprint templates from fingerprint images.

## MegaMatcher On Card Face Extractor component

MegaMatcher On Card 3.1 Face Extractor creates face templates in proprietary format from face images. The Extractor can generalize a face template from several face images to improve the template's quality. The algorithm has also the ability to recognize whether a face in a video stream belongs to a real human or is a photo, in order to improve the overall security of the system.

## MegaMatcher On Card Iris Extractor component

MegaMatcher On Card 3.1 Iris Extractor creates iris templates in proprietary format from eye images.



## Supported fingerprint scanners under Microsoft Windows

	Windows XP		Windows Vista		Windows 7	
	32-bit	64-bit	32-bit	64-bit	32-bit	64-bit
• ACS AET62 / AET65	+		+	+	+	+
• ARH AFS 510	+		+	+	+	+
• Atmel FingerChip	+					
• Athena ASEDive IIIe Combo Bio F2	+	+	+	+	+	+
• AuthenTec AES4000 / AES2501B / AES2550 / AES2660 / AES2810	+		+	+	+	+
• BioLink U-Match MatchBook v.3.5	+		+			
• Biometri-CS CS-Pass	+		+	+	+	+
• Biometrika Fx2000 / Fx3000	+		+			
• Biometrika HiScan	+					
• Cross Match L SCAN 500P / Guardian / Verifier 300 / 310 / 320	+	+	+	+	+	+
• Digent FD1000	+					
• DigitalPersona U.are.U 2000	+		+			
• DigitalPersona U.are.U 4000 / 4500	+	+	+	+	+	+
• Fujitsu MBF200	+					
• Futronic FS50 / FS80 / FS82 / FS88 / FS90 / eFAM (FS84)	+	+	+	+	+	+
• Futronic FS60	+		+		+	
• Green Bit DactyScan26 / DactyScan84n	+		+		+	
• Hongda S500 / S680 / S700	+		+			
• id3 Certis Image	+					
• Intech SOP1	+					
• Integrated Biometrics LES650	+	+	+	+	+	+
• Jstac Athena 210	+					
• Koehlke KIAU-5110B3 / KIA-UM01	+		+		+	
• L1 DFR 2080 / DFR 2090	+		+		+	
• L1 DFR 2100 / DFR 2300	+		+	+	+	+
• Lumidigm Mercury / Venus Series sensors	+	+	+	+	+	+
• NITGEN Fingkey Hamster / Fingkey Hamster II / Fingkey Mouse III / eNBioScan-F	+	+	+	+	+	+
• SecuGen Hamster III / Hamster Plus / Hamster IV / iD-USB SC / iD-USB SC/PIV	+	+	+	+	+	+
• Shanghai Fingertech BIOCA-111	+		+		+	
• Suprema BioMini / BioMini Plus / SFR300-S / SFU300	+		+	+	+	+
• Suprema RealScan-G10 / RealScan-10 / RealScan-D / RealScan-S	+		+		+	
• Tacoma CMOS	+		+			
• Testech Bio-i	+		+			
• TST Biometrics BiRD 3	+		+			
• UPEK Eikon / Eikon Solo / Eikon To Go / EikonTouch 300 / 700 / TouchChip	+		+	+	+	+
• ViRDI FOH02SC	+		+		+	
• VistaMT Multimodal Biometric Device	+	+	+	+	+	+
• ZKSoftware ZK4000 / ZK6000 / ZK7000 / ZK8000	+		+		+	
• ZKS-1000	+					
• Zvetco Verifi P4000	+		+	+	+	+



## Supported fingerprint scanners under Linux

	Linux (x86)	
	32-bit	64-bit
• ACS AET62 / AET65	+	+
• ARH AFS 510	+	+
• BioLink U-Match MatchBook v.3.5	+	
• DigitalPersona U.are.U 4000 / 4500		
• Fujitsu MBF200	+	+
• Futronic eFAM (FS84)	+	+
• Futronic FS50 / FS80 / FS82 / FS88 / FS90	+	
• Integrated Biometrics LES650	+	
• Lumidigm Mercury / Venus series sensors	+	
• NITGEN eNBioScan-F	+	
• SecuGen Hamster III	+	
• Suprema BioMini / BioMini Plus / SFR300-S / SFU300	+	
• Tacoma CMOS	+	+
• UPEK Eikon / Eikon Solo / Eikon To Go / EikonTouch 300 / 700 / TCRU1C / TCRU2C	+	+



## Supported face capture cameras

These cameras are supported by MegaMatcher On Card 3.1 SDK:

- Any **webcam** or camera that is accessible using:
  - **DirectShow** interface for Microsoft Windows platform
  - **GStreamer** interface for Linux platform.
- Also these specific models of high-resolution cameras are supported:
  - Axis M1114 camera (Microsoft Windows and Linux)
  - Cisco 4500 IP camera (Microsoft Windows only)
  - IrisGuard IG-AD100 face and iris camera (Microsoft Windows only)
  - Mobotix DualNight M12 IP camera (Microsoft Windows and Linux)
  - PiXORD N606 camera (Microsoft Windows and Linux)
  - Prosilica GigE Vision camera (Microsoft Windows only)
  - Sony SNC-CS50 camera (Microsoft Windows and Linux)
  - VistaFA2 / VistaFA2E / VistaEY2 face & iris cameras (Microsoft Windows only)
  - VistaMT Multimodal Biometric Device (Microsoft Windows only)

## Supported iris capture cameras

Iris capture cameras	Microsoft Windows XP		Microsoft Windows Vista		Microsoft Windows 7	
	32 bit	64 bit	32 bit	64 bit	32 bit	64 bit
• Cross Match I Scan 2	+		+			
• IrisGuard IG-AD100 iris & face camera	+		+		+	
• VistaFA2 / VistaFA2E / VistaEY2 iris & face cameras	+	+	+	+	+	+
• VistaMT Multimodal Biometric Device	+	+	+	+	+	+



## Technical Specifications

MegaMatcher On Card 3.1 can be configured according to different requirements and smart card constraints, at both pure Java Card level and native code. The summary of average memory requirements is available below. The MegaMatcher On Card 3.1 template matching engines performance was tested for smart cards from several vendors; see the testing results for more information on matching speed for a particular card.

- **500 dpi** is the recommended fingerprint image resolution.
- **640 x 480 pixels** is the recommended image size for face detection. **40 pixels** is the minimal distance between the eyes for face detection.
- MegaMatcher On Card face extraction engine has certain tolerance to face posture that assures face detection:
  - head **roll** (tilt) –  $\pm 15$  degrees from frontal position.
  - head **pitch** (nod) –  $\pm 15$  degrees from frontal position.
  - head **yaw** (bobble) –  $\pm 15$  degrees from frontal position.
- **640 x 480 pixels** is the minimum image size for iris capture.  **$\pm 15$  degrees** is the default iris rotation tolerance; this value can be extended on demand.

MegaMatcher On Card 3.1 memory requirements for native level integration (maximized accuracy configuration)			
	Code size (kilobytes)	Required RAM for data (bytes)	Template size (bytes)
Fingerprint verification engine	6.0 - 8.0	960 - 1,400 <sup>(1)</sup>	1,300 - 1,700 <sup>(1)</sup>
Face verification engine	Not implemented		
Iris verification engine			
Multi-modal verification engines			

<sup>(1)</sup> Depends on the configurable maximal number of minutiae.

MegaMatcher On Card 3.1 memory requirements for Java Card post-issuance libraries (maximized speed configuration)			
	Code size (kilobytes)	Required RAM for data (bytes)	Template size (bytes)
Fingerprint verification engine	less than 13.3	less than 600 <sup>(1)</sup>	less than 1,024 <sup>(1)</sup>
Face verification engine	less than 4.4	less than 16	less than 2,700 <sup>(2)</sup>
Iris verification engine	less than 8.3	less than 700 <sup>(3)</sup>	less than 1,100 <sup>(3)</sup>
Bi-modal fingerprint + face verification engine	less than 16	less than 600 <sup>(1) (2)</sup>	see specific modalities above
Bi-modal fingerprint + iris verification engine	less than 20	less than 800 <sup>(1) (3)</sup>	
Bi-modal face + iris verification engine	less than 11	less than 700 <sup>(2) (3)</sup>	
Tri-modal verification engine	less than 22	less than 800 <sup>(1) (2) (3)</sup>	

<sup>(1)</sup> Depends on the configurable maximal number of minutiae.

<sup>(2)</sup> Using faces compact card template format.

<sup>(3)</sup> Using irises compact card template format.



## Reliability & Performance Tests

The MegaMatcher On Card 3.1 template verification algorithm is a version of MegaMatcher 4.3 algorithm adapted to the limited computational resources of smart cards. These tests were performed:

- Reliability tests with publicly available databases for single biometric modalities;
- Reliability tests with an internal Neurotechnology multi-biometric database;
- Matching speed tests with smart card models from several vendors.

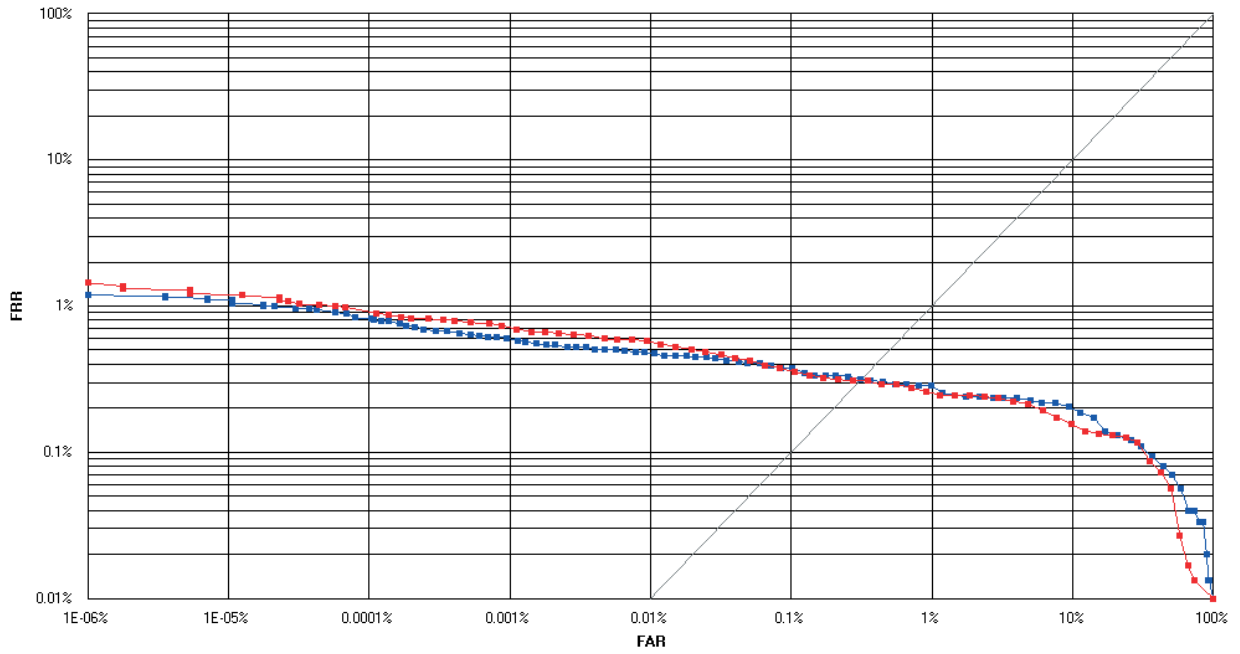
### Reliability tests with publicly available databases for single biometric modalities

These reliability tests compare the original MegaMatcher 4.3 and the MegaMatcher On Card 3.1 algorithms for fingerprint, face and iris modalities:

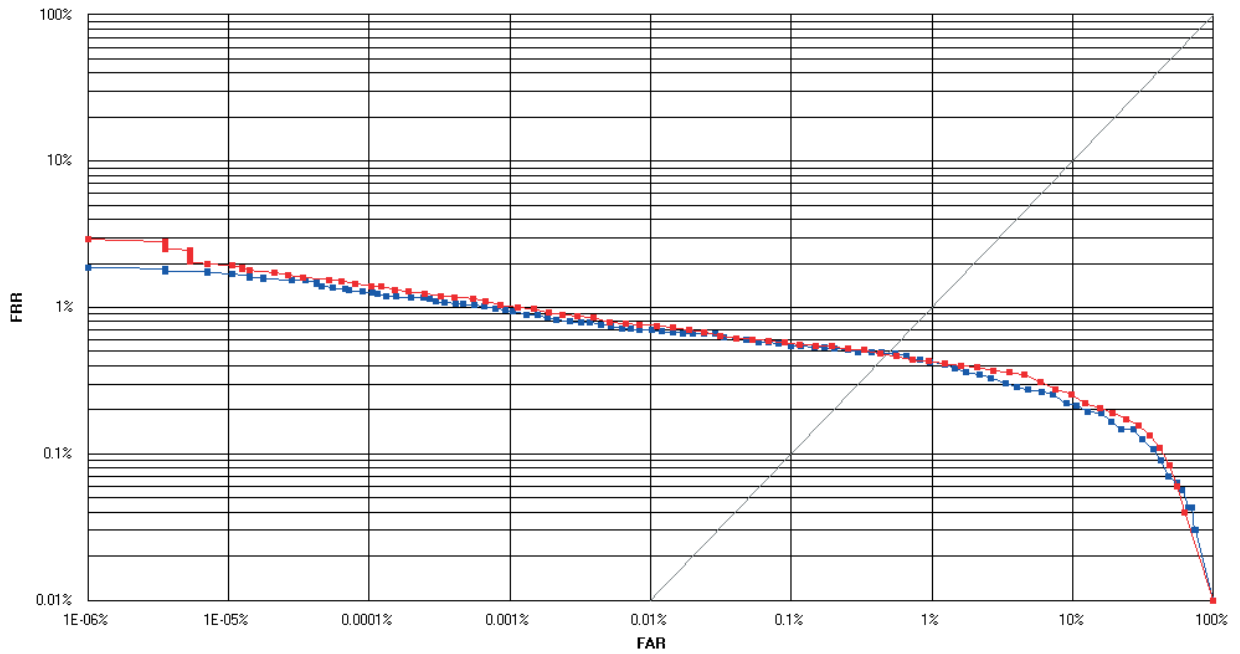
- **Fingerprint verification.** The tests were performed using a **subset** of **SONATEQ** Fingerprint Database SQ FDB1-75TS1:
  - only **left hand's index fingerprint** images were used;
  - **ISO/IEC 19794-2:2005** compact card minutiae format was used during testing;
  - the number of minutiae was **truncated to 48** in both probe and gallery compact templates prior to matching;
  - **±90 degrees fingerprint rotation tolerance** value was used for template matching;
  - maximized accuracy and maximized speed configurations were tested.
- **Face verification.** The tests were performed using face images from **XM2VTS** database.
  - **proprietary template format** was used during testing;
  - maximized speed configuration was used during testing.
- **Iris verification.** The tests were performed using iris images from **ND-IRIS-0405** Iris Image Dataset.
  - **proprietary template format** was used during testing;
  - maximized speed configuration was used during testing.

Receiver operation characteristics (**ROC**) curves are usually used to demonstrate the recognition quality of an algorithm. ROC curves show the dependence of false rejection rate (**FRR**) on the false acceptance rate (**FAR**).

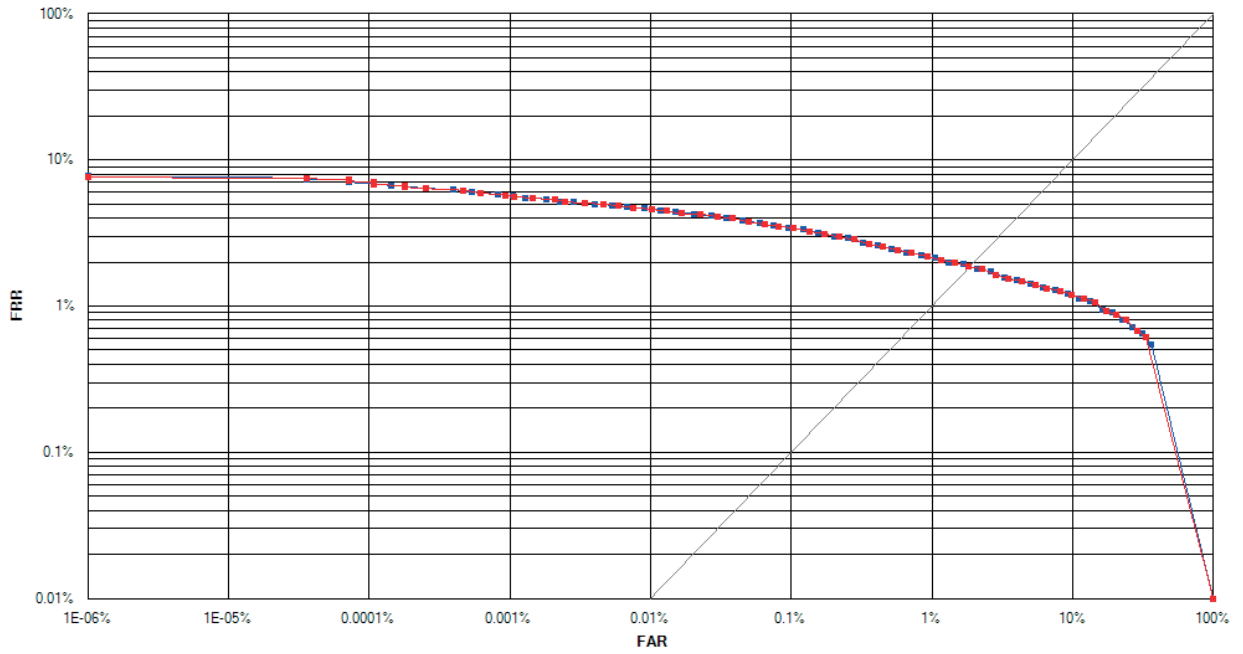
The charts with ROC curves are on the next pages.



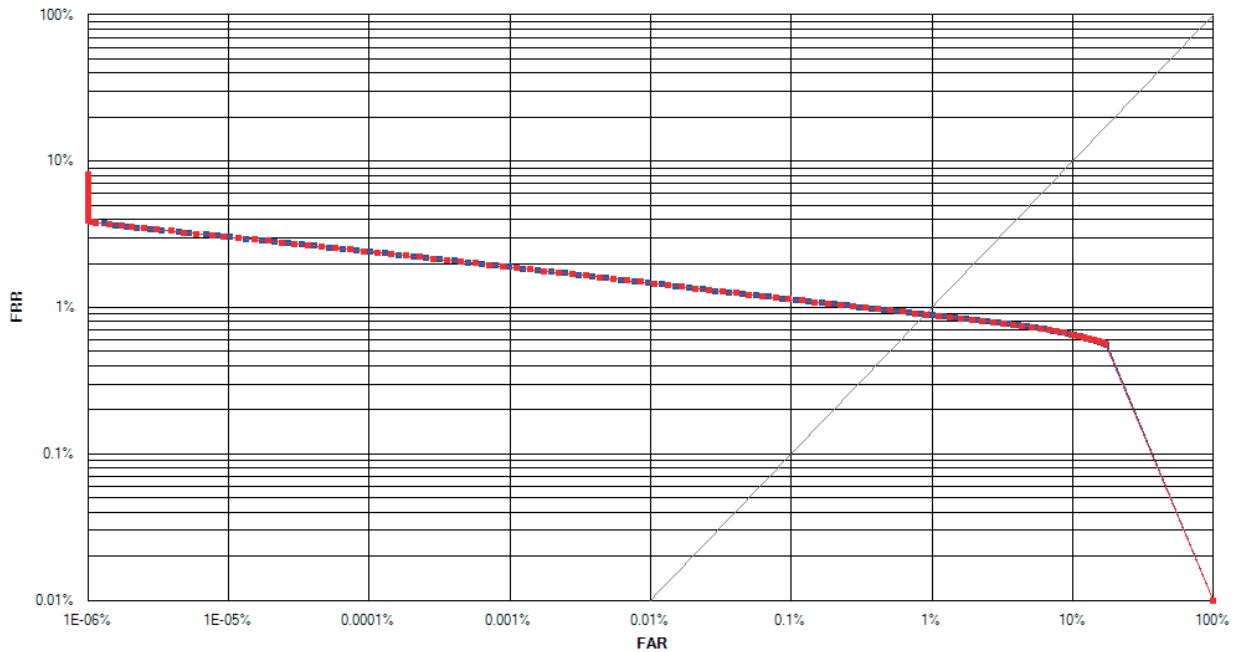
Algorithm comparison using ISO/IEC 19794-2:2005 compact card minutia storage format and a subset of SONATEQ Fingerprint Database SQ FDB1-75TS1:  
 ■ MegaMatcher On Card 3.1 fingerprint template verification algorithm (maximized accuracy configuration);  
 ■ MegaMatcher 4.3 fingerprint template verification algorithm (maximized accuracy configuration).



Algorithm comparison using ISO/IEC 19794-2:2005 compact card minutia storage format and a subset of SONATEQ Fingerprint Database SQ FDB1-75TS1:  
 ■ MegaMatcher On Card 3.1 fingerprint template verification algorithm (maximized speed configuration);  
 ■ MegaMatcher 4.3 fingerprint template verification algorithm (maximized speed configuration).



Algorithm comparison using Neurotechnology proprietary compact card facial template storage format and XM2VTS database:  
 ■ MegaMatcher On Card 3.1 face template verification algorithm (maximized speed configuration);  
 ■ MegaMatcher 4.3 face template verification algorithm (maximized speed configuration).



Algorithm comparison using Neurotechnology proprietary compact card iris template storage format and ND-IRIS-0405 database:  
 ■ MegaMatcher On Card 3.1 iris template verification algorithm (maximized speed configuration);  
 ■ MegaMatcher 4.3 iris template verification algorithm (maximized speed configuration).



## Reliability tests with an internal Neurotechnology multi-biometric database

The tests with MegaMatcher On Card biometric fingerprint, face and iris matching engines and fused template matching algorithm were performed using a multi-biometric database:

- The database had 7,500 sets of biometric records; each set contained 1 face, 2 irises and 10 fingerprints representing a unique person.
- 1,500 unique persons were represented in the database.
- 5 capture sessions were performed for each person.

The tests were performed with these biometric template types:

- **1 fingerprint record** – taken from left index fingerprint.
- **1 face record.**
- **1 iris record** – taken from left eye image.
- **2 fingerprint records** taken from same person's left and right index fingerprints.
- **2 iris records** taken from same person's different eyes.
- **1 fingerprint + 1 face records** left index fingerprint and face taken from the same person.
- **1 face + 1 iris records** left iris and face taken from the same person.
- **1 fingerprint + 1 iris records** left index fingerprint and left iris taken from the same person.
- **1 fingerprint + 1 face + 1 iris records** left index fingerprint, left iris and face taken from the same person.

The fingerprint template extraction and matching was performed with these settings:

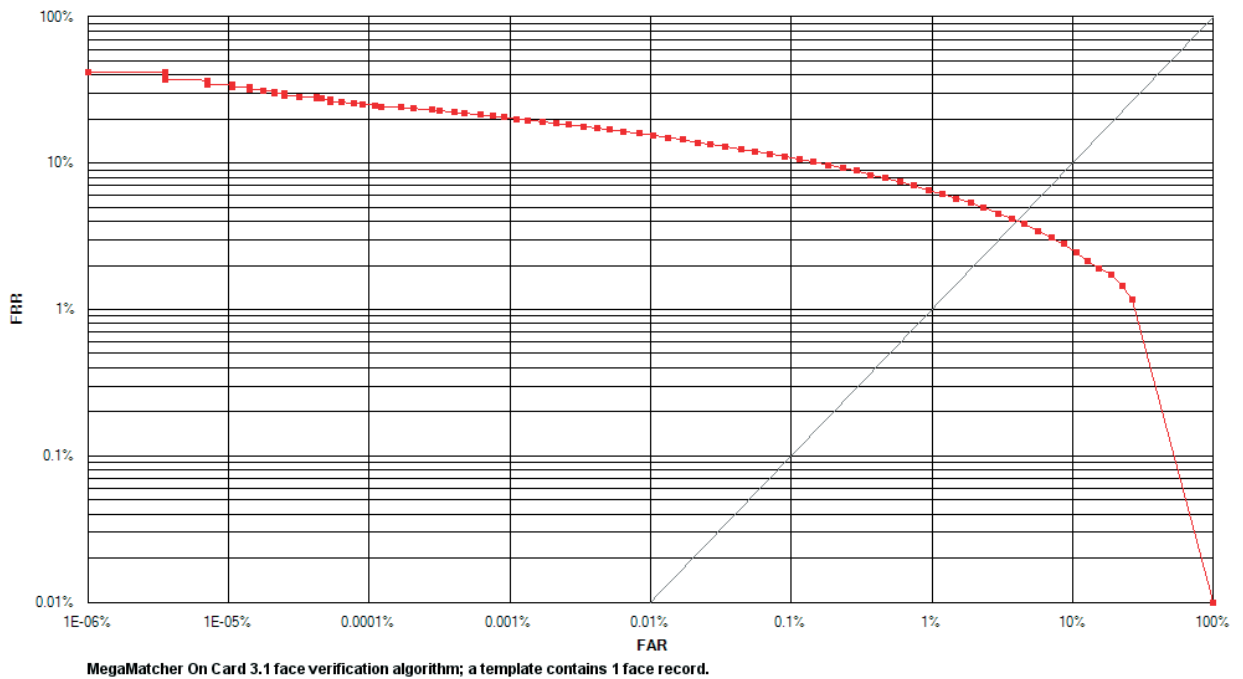
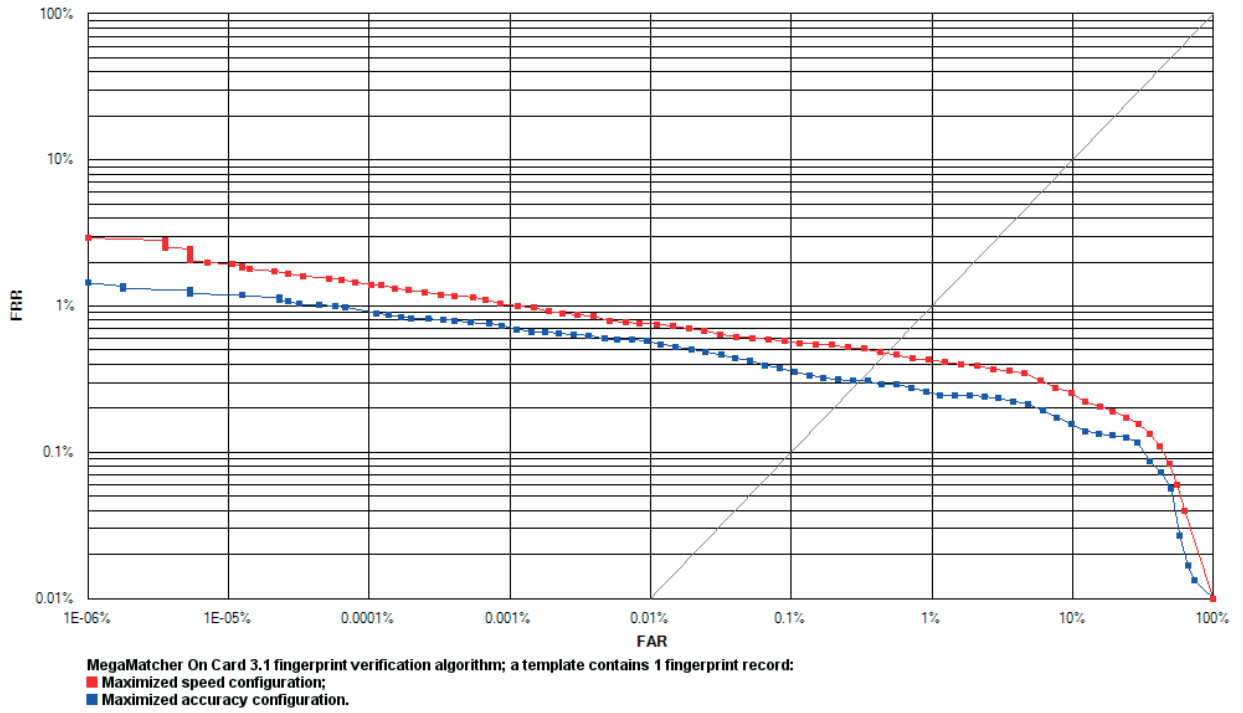
- the number of minutiae was **truncated to 48** in both probe and gallery compact templates prior to matching;
- **±90 degrees fingerprint rotation tolerance** value was used for template matching.

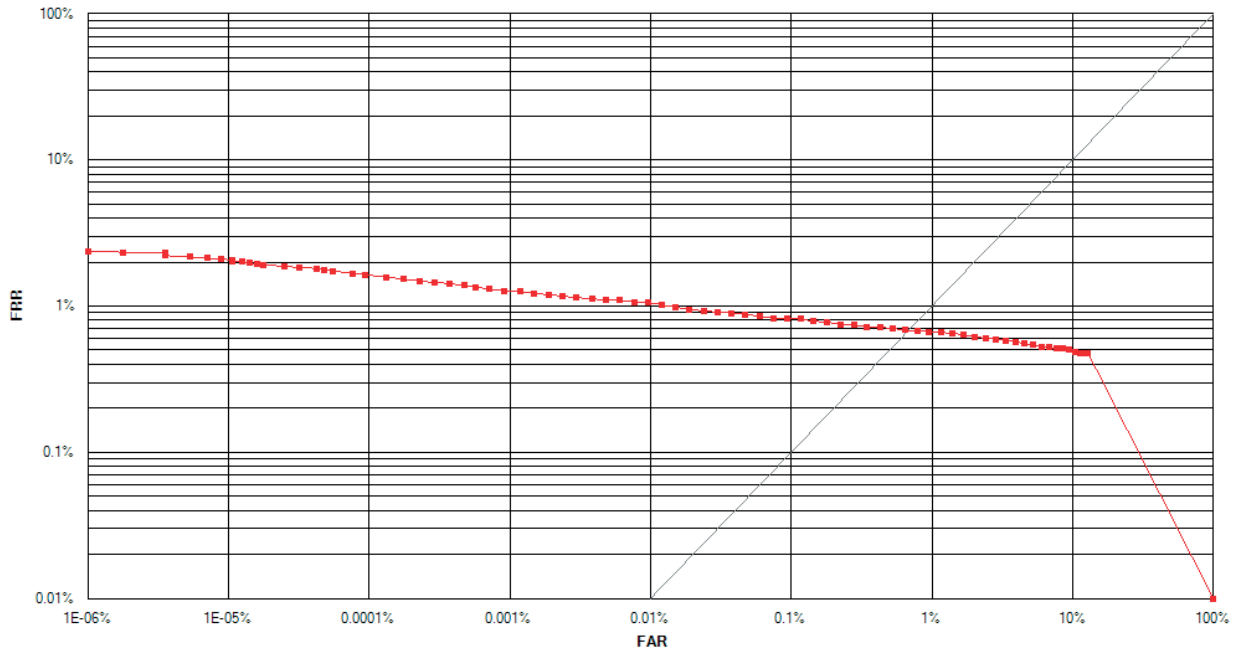
These experiments were performed with the templates:

- **Experiment 1** maximized **matching accuracy**. The experiment was performed only with template types that contained **fingerprint records**. MegaMatcher On Card 3.1 algorithm reliability in this test is shown as **blue curves** on the ROC charts.
- **Experiment 2** maximized **matching speed**. The experiment was performed with **all template types**. MegaMatcher On Card 3.1 algorithm reliability in this test is shown as **red curves** on the ROC charts.

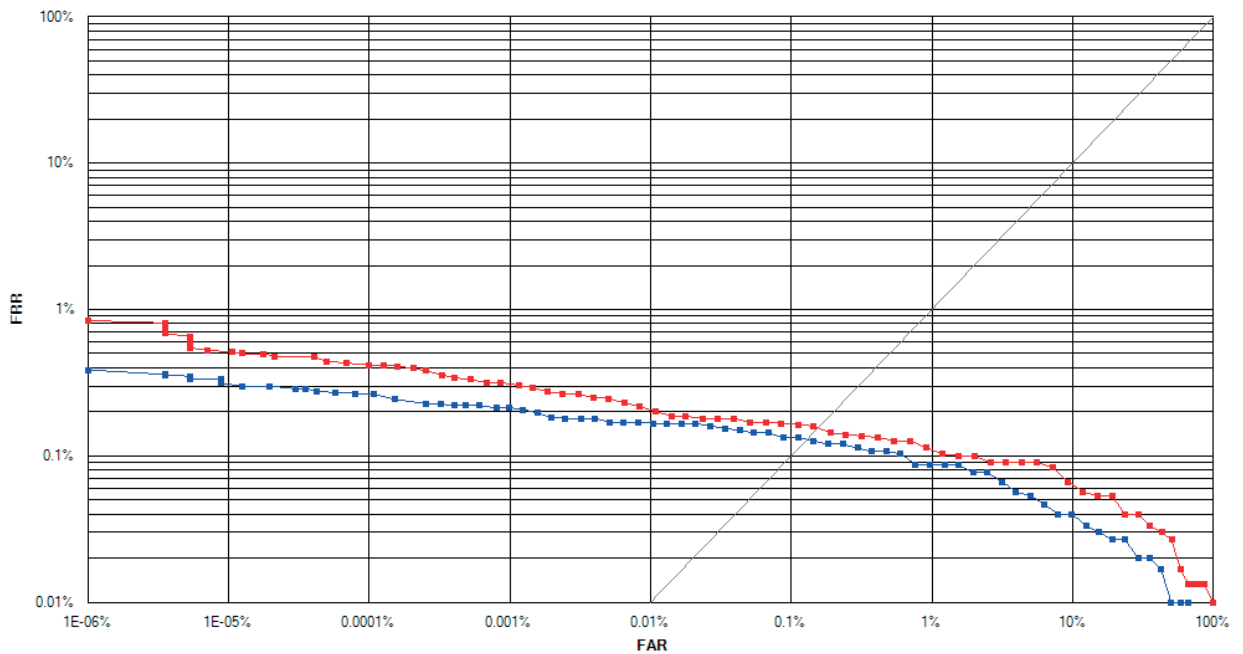
Receiver operation characteristics (**ROC**) curves are usually used to demonstrate the recognition quality of an algorithm. ROC curves show the dependence of false rejection rate (**FRR**) on the false acceptance rate (**FAR**).

The charts with ROC curves are on the next pages.



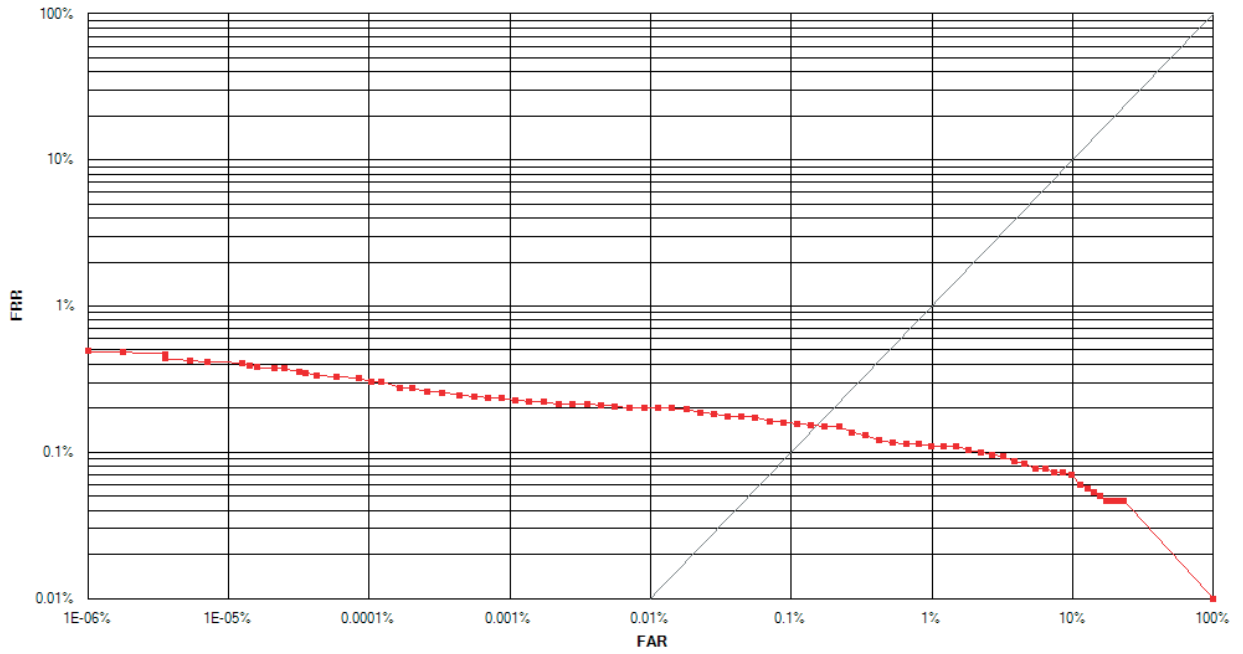


MegaMatcher On Card 3.1 iris verification algorithm; a template contains 1 iris record.

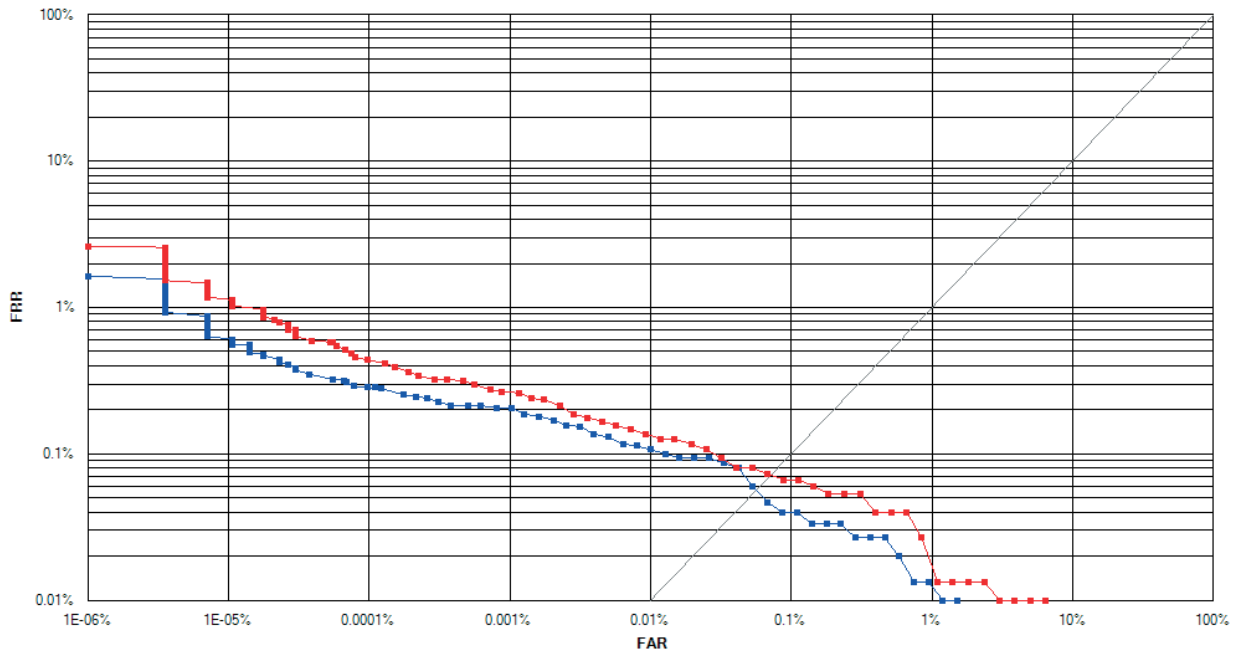


MegaMatcher On Card 3.1 fused template verification algorithm; a template contains 2 different fingerprints from the same person:

- Maximized speed configuration;
- Maximized accuracy configuration.

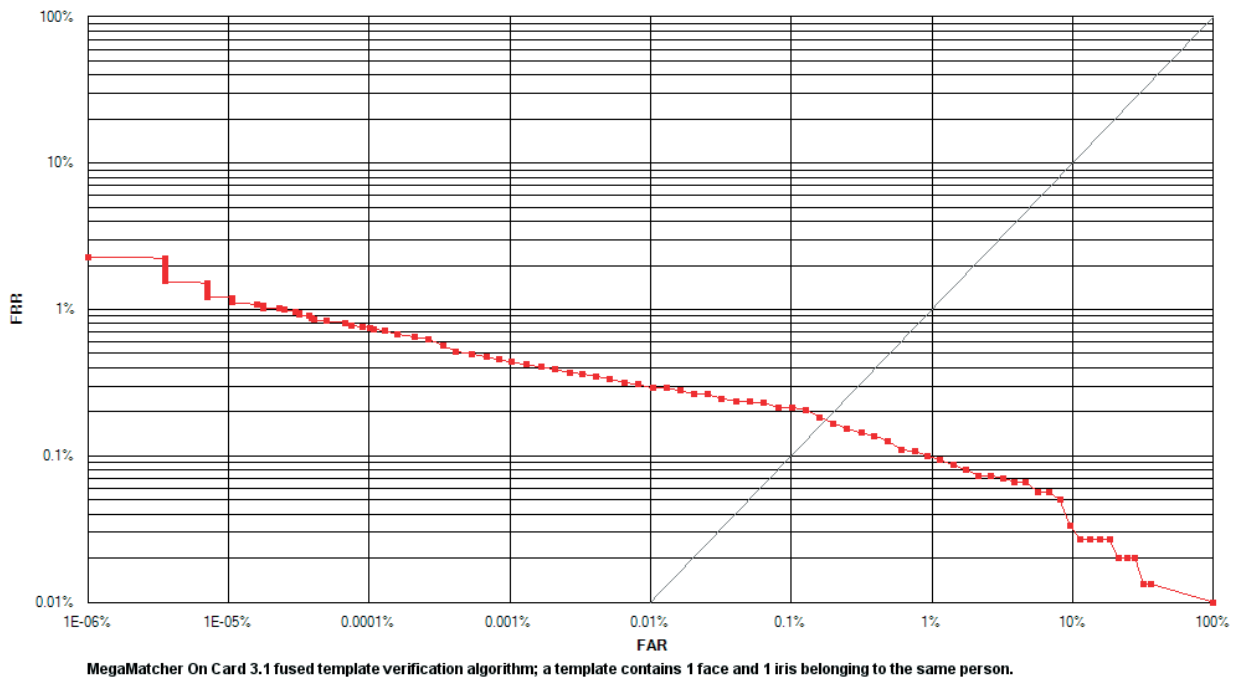
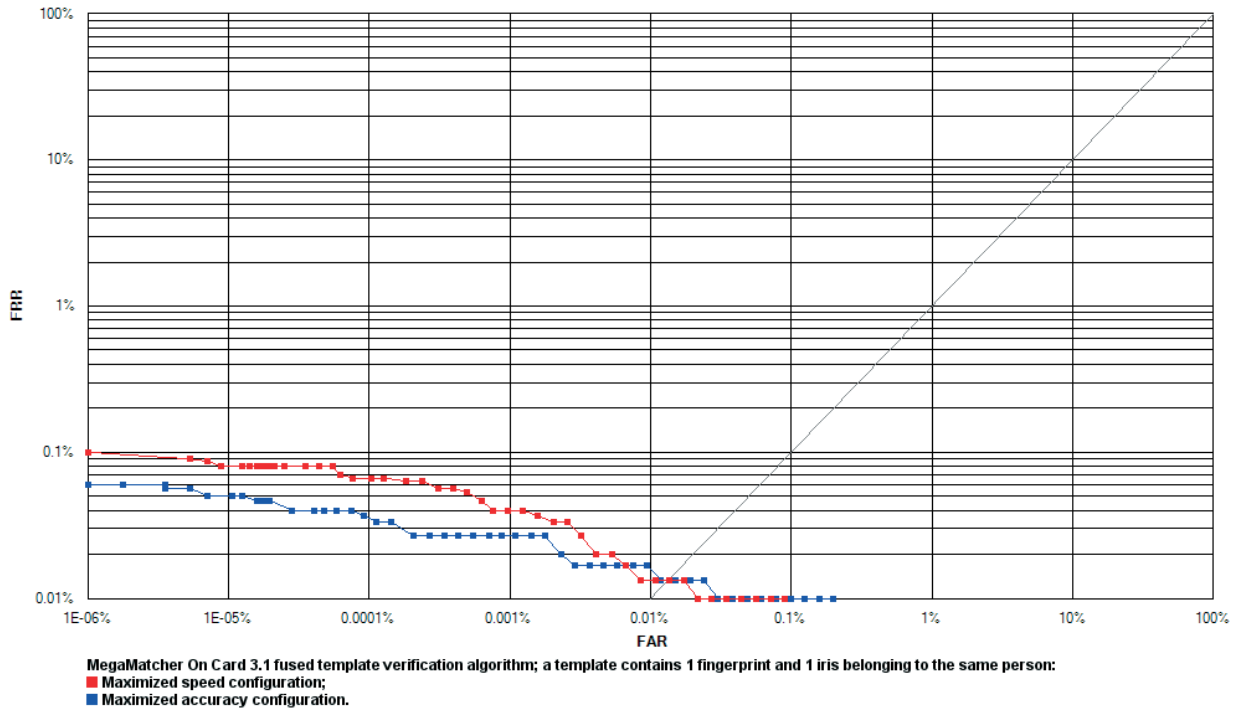


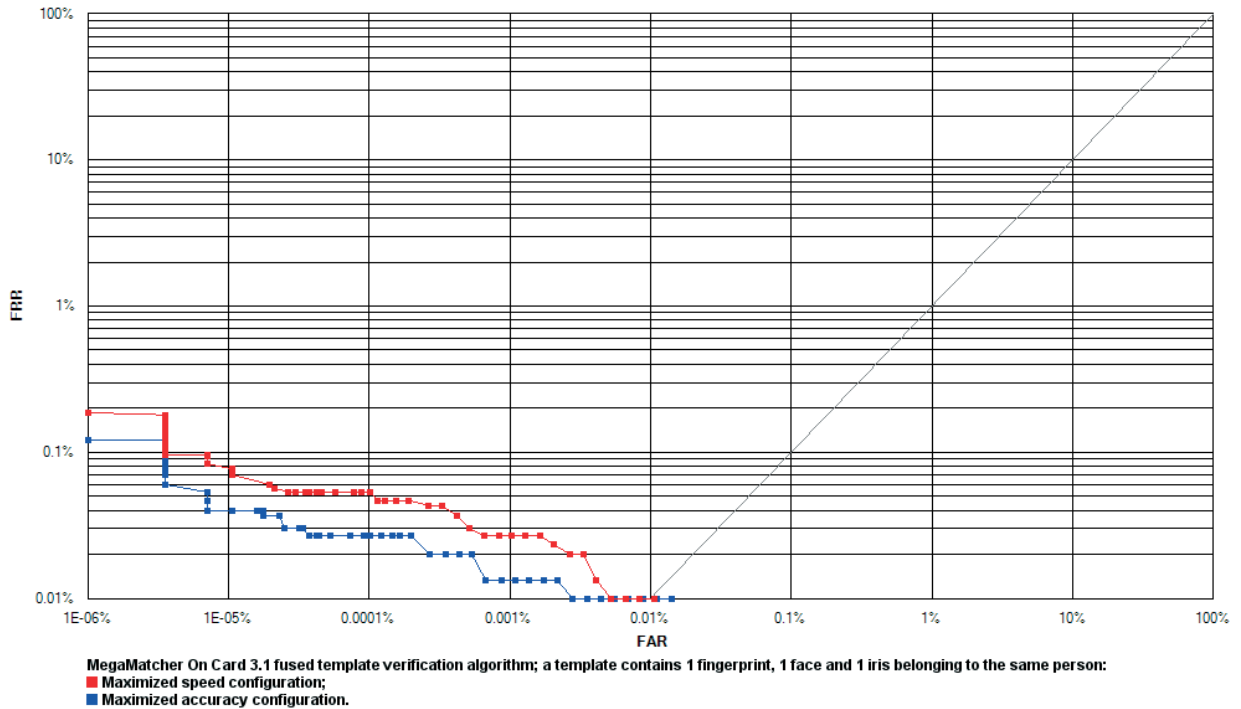
MegaMatcher On Card 3.1 fused template verification algorithm; a template contains 2 different irises from the same person.



MegaMatcher On Card 3.1 fused template verification algorithm; a template contains 1 fingerprint and 1 face belonging to the same person:

- Maximized speed configuration;
- Maximized accuracy configuration.





## Matching speed tests

MegaMatcher On Card 3.1 fingerprint, face and iris matching algorithms were tested on smart cards from several vendors. The matching speeds are available below. Please contact us to get more information about the expectations on a specific platform on which you intend to use it.

MegaMatcher On Card 3.1 average template verification time (seconds)			
	Fingerprints <sup>(1)</sup>	Faces <sup>(2)</sup>	Irises <sup>(2)</sup>
<b>Atmel AT90SC28872RCU</b> (native level, maximized accuracy configuration)	0.094	-	-
<b>ATHENA IDProtectV2</b> (post-issuance application, maximized speed configuration)	0.674	0.503	0.387
<b>NXP P5CC0037</b> (native level, maximized accuracy configuration)	1.114	-	-
<b>JCOP 2.4.1 R2</b> (post-issuance application, maximized speed configuration)	3.714	1.179 or 1.600	1.281 or 1.511
<b>JCOP 2.4.1 R3</b> (post-issuance application, maximized speed configuration)	1.945	1.423	1.054
<b>Samsung S3CC91C</b> (native level, maximized accuracy configuration)	0.548	-	-

(1) Performance depends on the maximal number of minutiae features within enrolled and verified fingerprint templates. Results correspond to matching test of an enrolled and verified templates each containing 48 minutiae. Contact SCR335 USB smart card reader was used for PC/SC communication.

(2) Performance depends on the baud rate of protocol and APDU type chosen. Results correspond to matching face and iris compact card format templates using short length field APDUs. Timings are available either for both contactless and contact or contact only interface tests. SCR335 and OMNIKEY 5321 USB smart card readers were used for contact or contactless test respectively.



## System requirements

### System requirements for installation and usage of components on JavaCard

- JavaCard 2.2.1 / 2.2.2 compatible smart card
- See the technical specifications section for the required amount of free persistent EEPROM and RAM

### System requirements for PC components installation and usage

- PC with **x86 (32bit)** or **x86-64 (64bit)** compatible processors. 2GHz or better processor is recommended.
- At least **128 MB of free RAM** should be available for the application.
- **Free space on hard disk drive (HDD):**
  - at least 1 GB required for the development.
  - 100 MB required for MegaMatcher On Card PC side components deployment.
- **Smart card reader.** An ISO/IEC 7816 compliant smart card reader is required.
- **Fingerprint scanner.** MegaMatcher On Card 3.1 includes support modules for more than 80 fingerprint scanners and sensors under different platforms.
- **Camera or webcam (optional)** for face image capture. MegaMatcher On Card 3.1 supports a number of high resolution cameras. Any other camera or webcam is supported by MegaMatcher On Card if it provides DirectShow interface for Windows platform or GStreamer interface for Linux platform.
- **Iris camera (optional)** for iris image capture. MegaMatcher On Card 3.1 includes support modules for several iris cameras.
- **Microsoft Windows specific requirements:**
  - Microsoft Windows XP / Vista / 7, 32-bit or 64-bit. 32-bit platform may be recommended for applications with fingerprint readers, as certain models have only 32-bit support modules.
  - Microsoft .NET framework 2.0 or newer (for .NET components usage).
  - One of the following development environments for application development:
    - Microsoft Visual Studio 2005 SP1 or newer (for application development under C/C++, C#, Visual Basic .Net)
    - Sun Java 1.5 SDK or later
- **Linux specific requirements:**
  - Linux 2.6 or newer kernel, 32-bit only.
  - glibc 2.3.6 or newer
  - GTK+ 2.10.x or newer libs and dev packages (to run SDK samples and applications based on them)
  - GCC-4.0.x or newer (for application development)
  - GNU Make 3.81 or newer (for application development)
  - Sun Java 1.5 SDK or later (for application development with Java)
  - PCSC-Lite 1.4.4 or newer
  - ccid-1.3.0 or newer



## Related Products

These Neurotechnology products are related to MegaMatcher On Card SDK:

- **MegaMatcher SDK** – intended for development of AFIS or multi-biometric fingerprint, face, iris and palm print identification products. See *MegaMatcher SDK brochure* for more information.
- **VeriFinger SDK** – intended for development of PC-based or Web-based fingerprint identification systems. See *VeriFinger SDK brochure* for more information.
- **VeriLook SDK** – intended for development of PC-based or Web-based face identification systems. See *VeriLook SDK brochure* for more information.
- **VeriEye SDK** – intended for development of PC-based or Web-based face identification systems. See *VeriEye SDK brochure* for more information.



## Licensing MegaMatcher On Card

The following licensing model is intended for **end-user** product developers. Integrators who want to develop and sell a MegaMatcher On Card based development tool (with API, programming possibilities, programming samples, etc.), must obtain permission from Neurotechnology and sign a special VAR agreement.

### Product Development

An integrator should obtain a MegaMatcher On Card 3.1 SDK (EUR 439) to develop a product based on MegaMatcher On Card technology. The SDK needs to be purchased just once and may be used by all the developers within the integrator's company.

MegaMatcher On Card SDK includes components for biometric template extraction on PC-side and smart cards with preinstalled fingerprint, iris and face template matching engines. A **license** for an individual MegaMatcher On Card component is required for **each CPU** that **runs** the component (a processor can have any number of cores).

These components are included with MegaMatcher On Card 3.1 SDK:

- PC-side components and licenses:
  - 2 single computer licenses for MegaMatcher On Card Fingerprint Extractor
  - 1 single computer license for MegaMatcher On Card Face Extractor
  - 1 single computer license for MegaMatcher On Card Iris Extractor
- Smart card-side components:
  - 2 smart cards with MegaMatcher On Card 3.1 fingerprint matching engine.
  - 1 smart card with MegaMatcher On Card 3.1 multi-modal fingerprint, face and iris matching engine.

The PC-side components are copy-protected – a license is required for a component to run. License activation options are listed below.

Additional PC-side component licenses may be obtained by MegaMatcher On Card SDK customers as required by their development process.

Additional cards with installed fingerprint, iris and/or face matching component for the product development may be obtained at any time, according to stock and availability of suppliers.

### Product Deployment

To deploy a product developed with MegaMatcher On Card 3.1 SDK, an integrator need obtain only the additional smart cards with fingerprint, iris and/or face matching engines and the licenses required for the particular MegaMatcher On Card 3.1 SDK components that will run on **each CPU** of their customer's computers. The available MegaMatcher On Card 3.1 SDK components and license types for product deployment are the same as for product development.

Each MegaMatcher On Card component running on a computer belonging to the integrator's customer requires a license. License activation options are listed below on this page.

Prices for the additional MegaMatcher On Card extractor component licenses can be found in the next chapter.

Additional cards with installed fingerprint, iris and/or face matching component for the product deployment can be obtained at any time, according to stock and availability of suppliers.

Please also refer to MegaMatcher On Card SDK Software License Agreement for all licensing terms and conditions.

For **large projects** that include more than 100,000 card licenses, MegaMatcher On Card 3.1 matching components are available with different forms of licensing. Please contact us for more information.



## Single computer licenses

A single computer license allows the installation and running of a MegaMatcher On Card Fingerprint Extractor, MegaMatcher On Card Iris Extractor or MegaMatcher On Card Face Extractor component installation on one CPU (a processor can have any number of cores). Neurotechnology provides a way to renew the license if the computer undergoes changes due to technical maintenance.

Each single computer license requires activation for a MegaMatcher On Card component to run. The available activation options are listed below.

Additional single computer licenses for MegaMatcher On Card components may be obtained at any time by MegaMatcher On Card SDK customers.

## License activation options

Single computer licenses are supplied in two ways:

- **Serial numbers** are used to activate licenses for particular MegaMatcher On Card PC-side components. The activation is done via the Internet or by email. After activation the network connection is not required for single computer license usage.  
Note: activation by serial number is not suitable for virtual environments.
- Licenses may be stored in a volume license manager **dongle**. License activation using volume license manager may be performed without connection to the Internet and is suitable for virtual environments.

## Volume license manager

Volume license manager is used on site by integrators or end users to manage licenses for MegaMatcher On Card PC-side components. It consists of license management software and a dongle, used to store the purchased licenses. An integrator or an end-user may use the volume license manager in the following ways:

- **Activating single computer licenses** – An installation license for a MegaMatcher On Card component will be activated for use on a particular computer. The number of available licenses in the license manager will be decreased by the number of activated licenses.
- **Managing single computer or concurrent licenses via a LAN or the Internet** – The license manager allows the management of installation licenses for MegaMatcher On Card PC-side components across multiple computers in a LAN or over the Internet. The number of managed licenses is limited by the number of licenses in the license manager. No license activation is required and the license quantity is not decreased. Once issued, the license is assigned to a specific computer on the network.
- **Using license manager as a dongle** – A volume license manager containing at least one license for a MegaMatcher On Card PC-side component may be used as a dongle, allowing the MegaMatcher On Card component to run on the particular computer where the dongle is attached.

Additional MegaMatcher On Card PC-side component licenses for the license manager may be purchased at any time. Neurotechnology will generate an update code and send it to you. Simply enter the code into the license manager to add the purchased licenses.



## Prices for MegaMatcher On Card SDK

- The prices are **effective from April 2, 2012**. The prices may change in the future, so please **download and review the latest version** of the brochure before making an order.
- Quantity discounts do not accumulate over time.
- The prices do not include any taxes.
- Product shipping cost depends on delivery country
- Our customers can gain a discount for our products by getting the Solution Partner status.

MegaMatcher On Card SDK			
MegaMatcher On Card 3.1 SDK	€ 439.00		
Additional smart cards with fingerprint, iris and/or face matching engines	contact us		
MegaMatcher On Card Extractor components (price per single computer license)			
Quantity	MegaMatcher On Card Fingerprint Extractor	MegaMatcher On Card Face Extractor	MegaMatcher On Card Iris Extractor
1 - 9	€ 12.00	€ 12.00	€ 59.00
10 - 19	€ 8.70	€ 8.70	€ 43.00
20 - 49	€ 7.50	€ 7.50	€ 38.00
50 - 99	€ 6.30	€ 6.30	€ 33.00
100 - 199	€ 5.40	€ 5.40	€ 30.00
200 - 499	€ 4.50	€ 4.50	€ 27.00
500 - 999	€ 3.60	€ 3.60	€ 24.00
1,000 - 1,999	€ 2.70	€ 2.70	€ 21.00
2,000 - 3,999	€ 1.80	€ 1.80	€ 19.00
4,000 - 7,999	€ 1.32	€ 1.32	€ 17.00
8,000 and more	contact us		
License management			
Volume license manager	€ 16.00		

MegaMatcher On Card SDK and related products can be ordered:

- online, at [www.neurotechnology.com/cgi-bin/order.cgi](http://www.neurotechnology.com/cgi-bin/order.cgi)
- via a local Neurotechnology distributor; the list of distributors is available at [www.neurotechnology.com/distributors.html](http://www.neurotechnology.com/distributors.html)