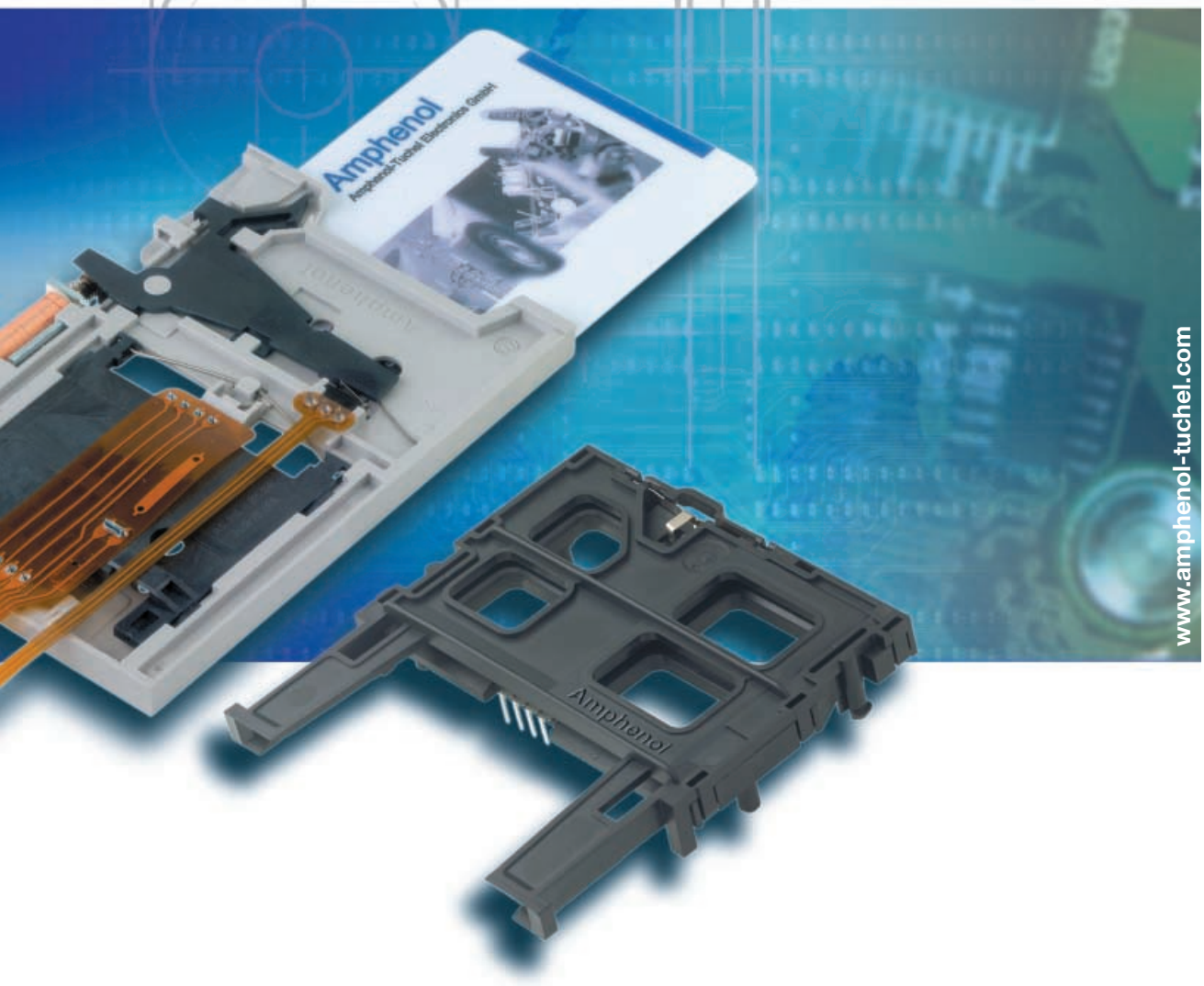
Amphenol

Amphenol-Tuchel Electronics GmbH

Smart Card Connectors

Series C 700



Security information

It is the user's responsibility to check whether the components illustrated in this catalogue comply with different regulations from those stated in special fields of application which we are unable to forsee.

These connectors are designed and produced in conformity with the low-voltage directive (72/73/EWG) respectively Gerätesicherheitsgesetz (German Law). We reserve the right to change the design due to improvement in quality, development or production requirements.

This catalogue must not be used in any form or manner without our prior approval in writing (Copyright Law, Fair Trading Law, Civil Code).

IP degree of protection for all Smart Card Connectors is IP 00, if not mentioned otherwise in technical data.

As far as Smart Card Connectors are mentioned without protection against electric shock, only Safety Extra Low Voltage (SELF) of AC 25 V_{eff} or DC 50 V is permissible. When mounted with protection against electric shock see table rated voltage acc. to IEC 60664-1.

The products specified in this catalogue have been developed for soldering proceedings with Sn Pb alloys. Other soldering proceedings are possible upon request.

Basically Smart Card Connectors are designed for indoor and outdoor applications with low dirt/dust contamination and environmental influences.

Connectors and/or plug and socket devices may only be used according to the specified technical ratings.
Please note that technical ratings represent often only initial values which have been investigated under determined conditions (tests) and may change under longer or stress conditions.

The referred IEC-Standards correspond to the DIN EN-Standards.

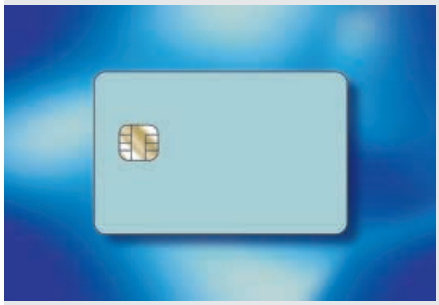
Chip Cards

Chip Cards, Smart Cards, IC Cards or whatever application specific term is used ... have one thing in common:

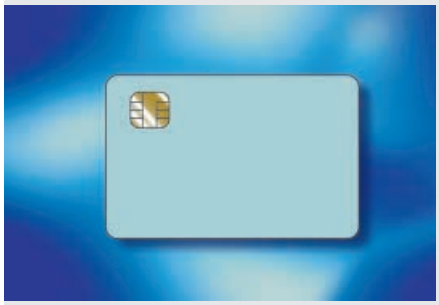
- the outside dimensions, standardized acc. to ISO 7810, the size of a common credit card
- and the position of the contact pads, (which connect the embedded IC chip) are fixed according to ISO 7816.

The most used chip contacts are:

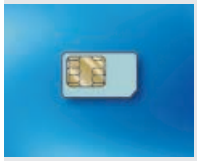
Type ID-1, Chip middle position (ISO)



Type ID-1, Chip outer position (AFNOR)



SIM/SAM-Card, ID-000, GSM 11.11



MultiMediaCard, acc. to MMCA - Spezification

MULTIMEDIACARD ASSOCIATION

Secure Digital Memory Card, acc. to SDA - Spezification

Amphenol Smart Card Connectors

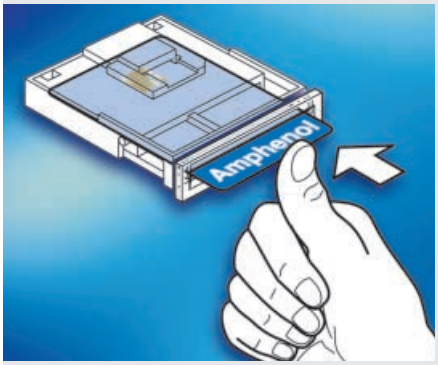
Smart Card Connectors are integral components of a smart card reader or terminal, and provide electrical contact to the smart card's pads. The connector is not a stand alone peripheral device.

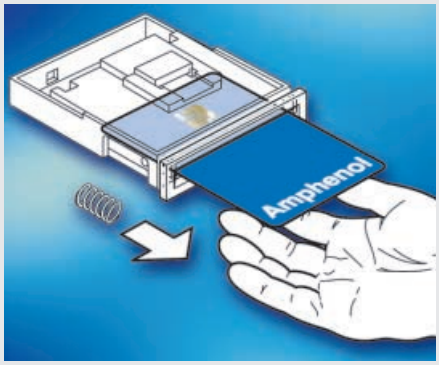
An additional interface circuit is necessary to be able to read and write to the smart card whether a smart card is a memory only or a microprocessor card. Amphenol Smart Card Connectors are designed to make secure contact to all cards designed according to ISO 7816 and thus ensure a reliable data transmission.

The communication with the chip card can begin when the card is fully inserted and the data contacts are all connected. At this point an integral card presence switch is activated and signals to the connected circuitry that the card is ready to be read and written to.

Smart Card Connectors for payment systems according to EMV (Europay Mastercard Visa / Integrated Circuit Card Specification for Payment Systems) have a specific card end position switch which detects the insertion and removal of a Smart Card.

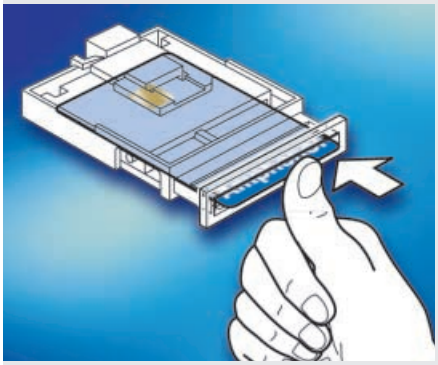
Card Handling Systems

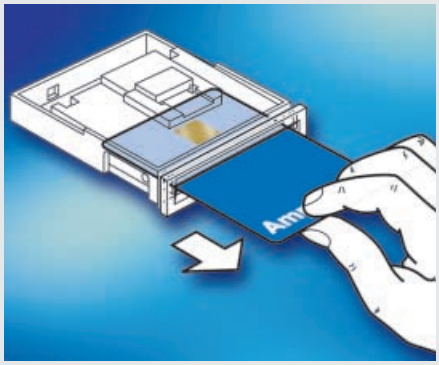




Push-Only

The card is inserted manually and held in the active position by hand. The card is ejected immediately after the user releases it. The Push-Only is ideally suited for applications with short transaction cycles, ie. door access control.

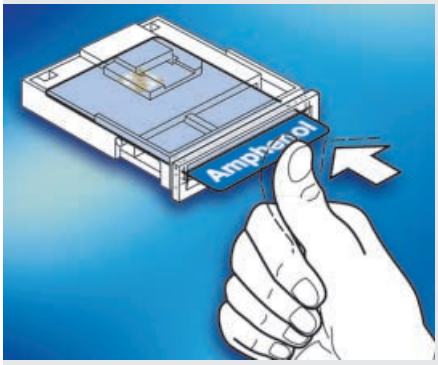


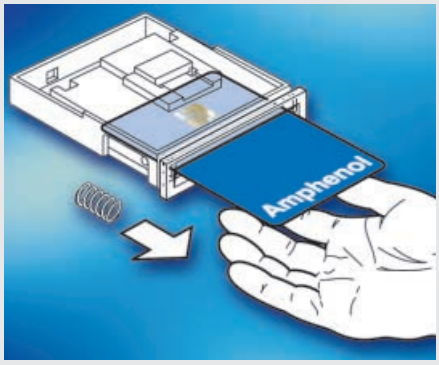


Push-Pull

The card is inserted manually and held in the active position by a card brake. After completion of the transaction, the card is simply pulled out of the Smart Card Connector.

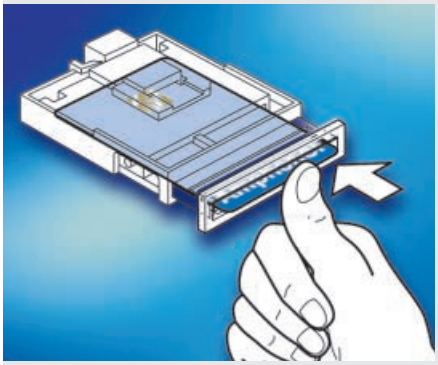
This is the most common manual card handling system.

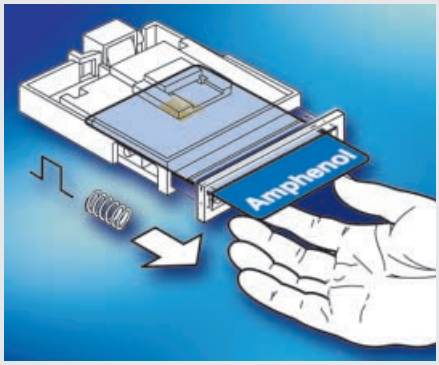




Push-Push

The card is inserted manually and held in the active position by the Smart Card Connector. When pushed again the card is returned to the user (principle of a ballpoint pen).

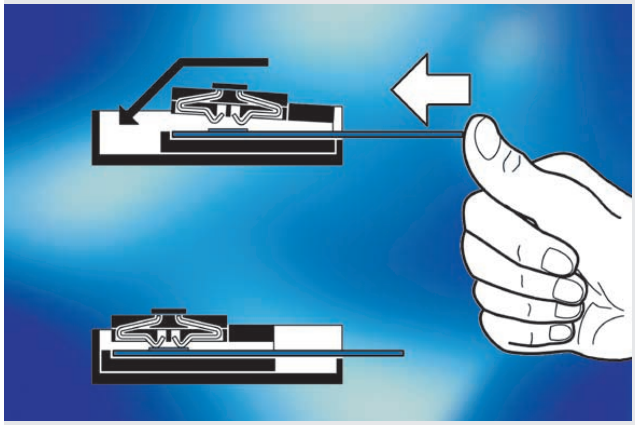




PUSHMATIC®

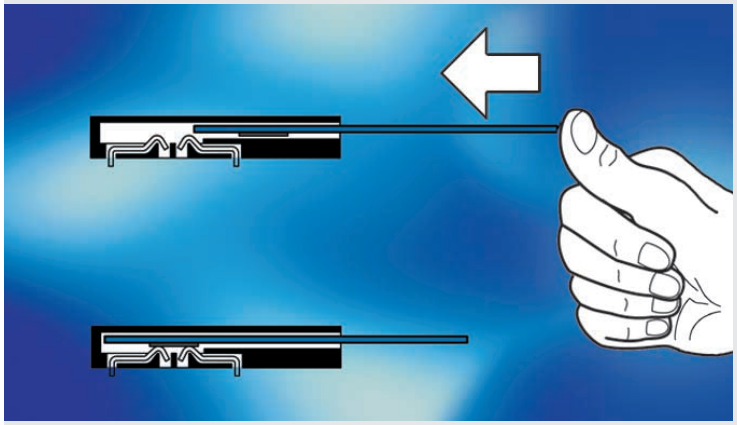
This semi-automatic system combines a manual card insertion with an automatic card ejection. The card is manually pushed into the Smart Card Connector until it is flush (or nearly flush) with the bezel.
Upon completion of the transaction, software triggers a solenoid and the card is ejected back to the user.

Contact Methods

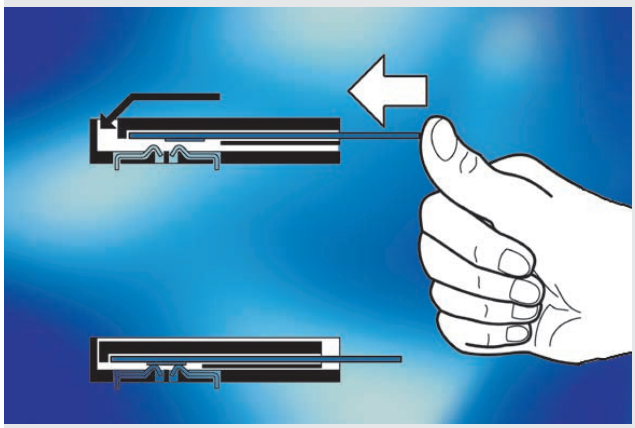


Landing Contacts
With this contact method a moveable contact set will connect with the pads of the chip card upon insertion of the card.

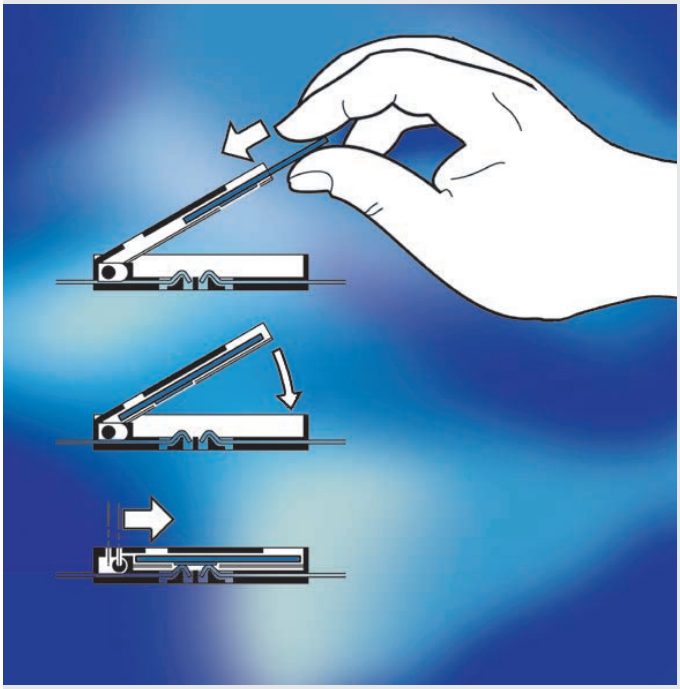
The card plastic surface is not scratched and high mating cycles can be achieved.



Wiping Contacts
The contact set is fixed. When the card is inserted, it wipes over the data contacts until they arrive at the card pads. Depending upon the card surface, wiping traces which do not influence the card function can occur after some insertion cycles.
The advantage of wiping contacts is that they clean the contact point with every mating cycle.



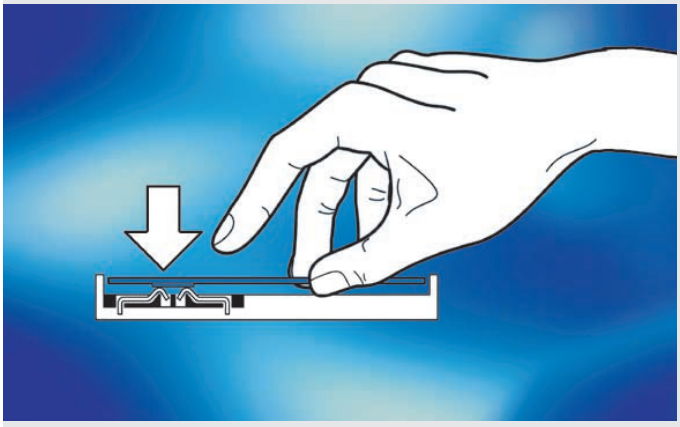
Landing Card
This method of contacting is based on a fixed contact set. The chip card is lowered during its insertion.
The contact areas of the chip card land smoothly on the reading contacts which results in the possibility of a high number of mating cycles.
In addition this system makes sure that with each insertion the contact surfaces are cleaned.



SIMLOCK®

In cases where chip cards with the dimensions of a full size ISO 7816 are too large, the SIMLOCK® comes into use. With its latching cover for the insertion of the smaller SIM card it offers a safe contact interface even in mobile usage.
Due to the locking system the user does not have to consider tolerances or card guiding.

The design and packaging of the Amphenol SIMLOCK® allows manual and automatic pick and placement prior to surface mount soldering.



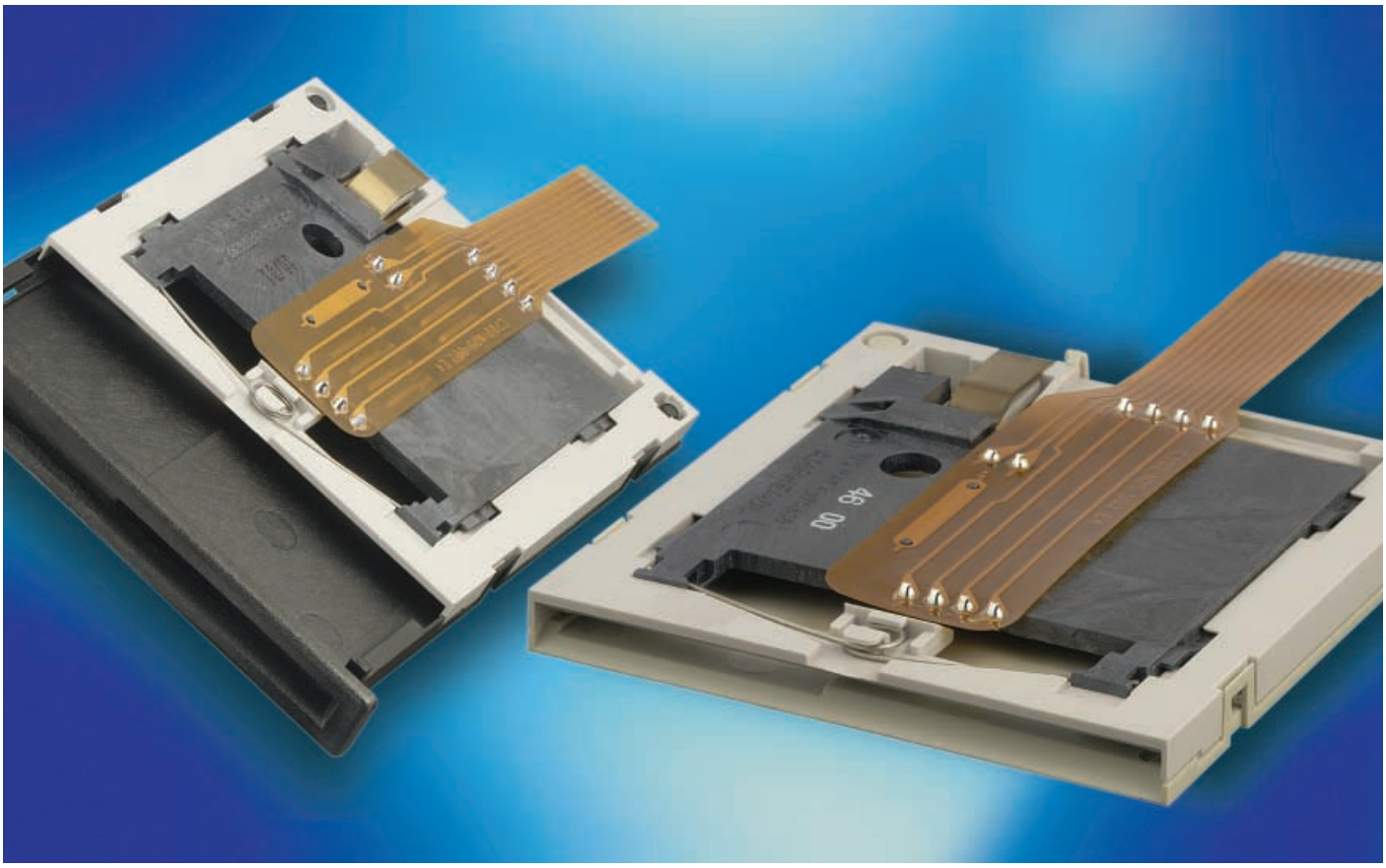
SIMBLOCK®

These Smart Card Connectors, due to their minimal space requirement and low height are the ideal components for many space restricted applications, from handsets to the electronic purse. The connector is suitable for standard chip cards per ISO 7816 as well as for plug-in SIM cards.

The SMT terminals and packaging for automatic handling allow the use of pick and place robots and modern surface solder technologies.
Positioning and support of the chip card has to be ensured by the user.

Smart Card Connectors
Superflat Style

Series C702D



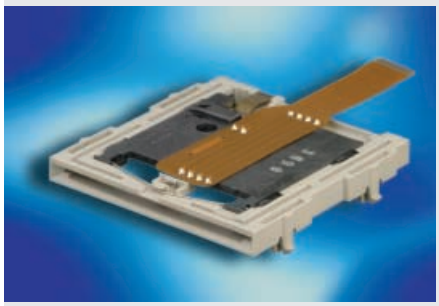
Superflat Style Smart Card Connector is a Push-Pull Series of 2nd generation connectors with landing contacts providing a high degree of miniaturization. Suitable applications include: point-of-sales systems, mobile devices, access control, keyboards, etc.

Design features

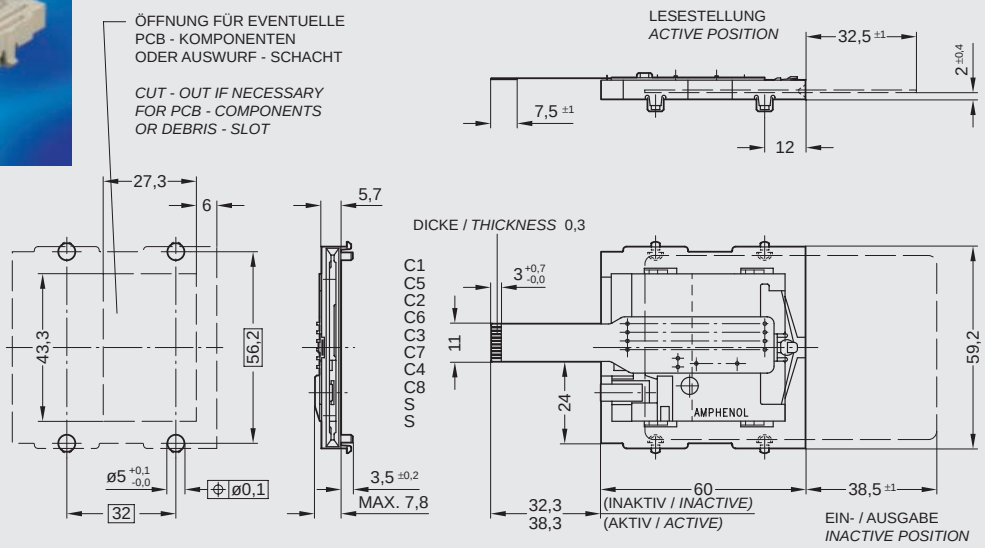
- miniature size ideally suited for mobile devices
- additional space saving possible by integration of base into customer housing
- Versions acc. to EMV (see page 6)
- dip solder version available featuring snap-in mounting, chip side up card insertion, and a debris slot to provide egress of coins, paper, etc.
- snap-in version also available with flexprint termination (both SMT and PCB)

Assembly instructions:
Please make sure that flexprints remain free and unrestricted after assembly.

C702D Smart Card Connectors Superflat Style



Description	Contact position	Part No.
with board locks	ISO	C702 10M008 061 4
with board locks, acc. to EMV	ISO	C702 10M008 066 4



C702D Technical Data

Electrical Characteristics	Standard	Value
Contact resistance without cable or flexprint	IEC 60512-2, Test 2a	Data contacts ≤ 30 mΩ Switch contacts ≤ 40 mΩ
Insulation resistance	IEC 60512-2, Test 3a	≥ 10^9 Ω
High voltage resistance	IEC 60512-2, Test 4a	500 V_{AC}; 1 min

Climatical Characteristics		
Climatic category	IEC 60068-1	25 / 65 / 56
Operating temperature		- 25 °C ... + 65 °C
Storage temperature		- 40 °C ... + 85 °C

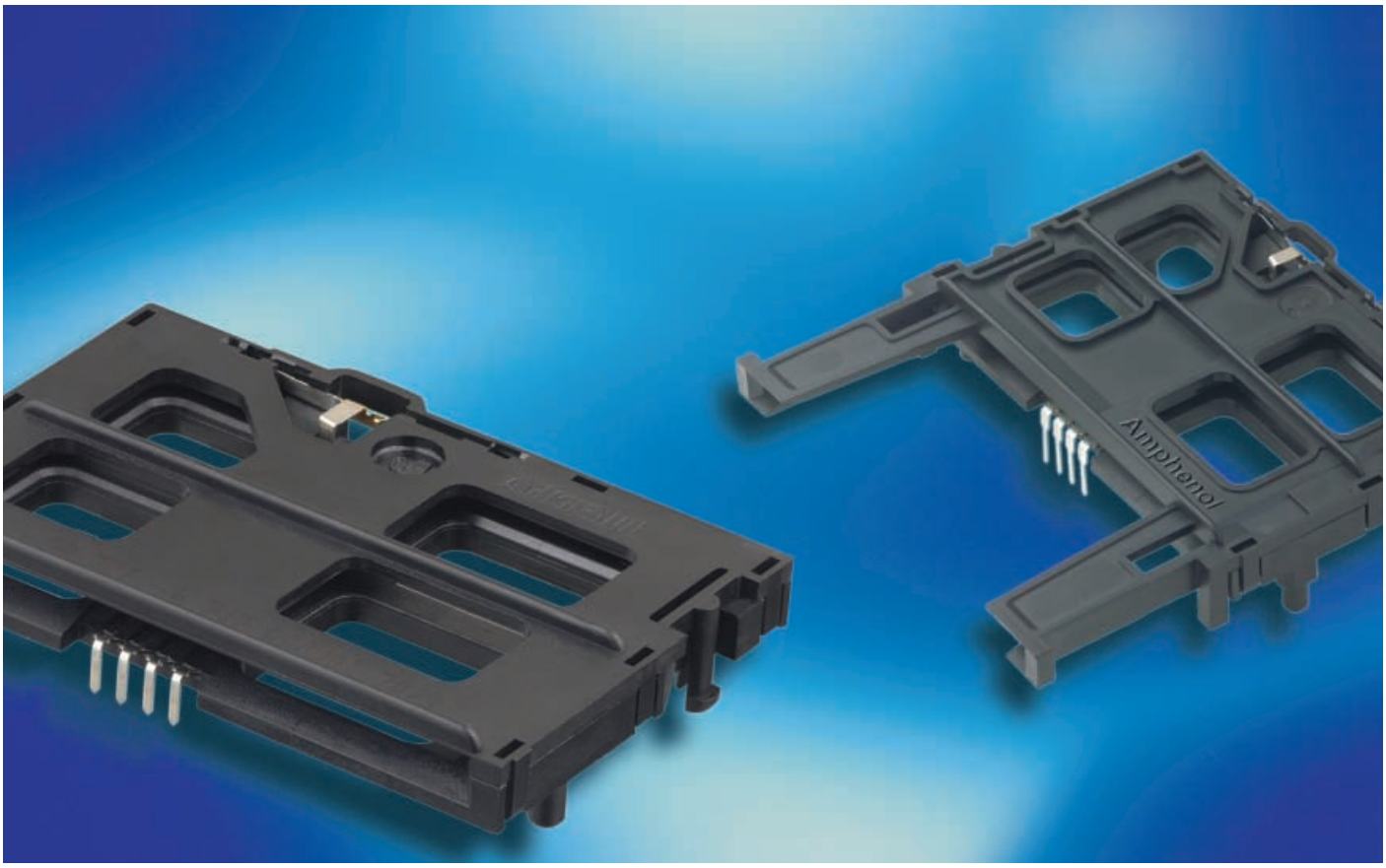
Mechanical Characteristics		Standard	EMV-Version
Card insertion force standard	IEC 60512-7, Test 13b	≤ 8 N	≤ 10 N
Card extraction force standard	IEC 60512-7, Test 13b	≥ 3 N	≥ 2 N
Mechanical lifetime	IEC 60512-5, Test 9a (without corrosion)	300,000 mating cycles	
Vibration	IEC 60512-4, Test 6d	f = 10 ... 60 Hz 0.7 mm DA f = 60 ... 500 Hz a = 5 g 2 h / axis	
Shock, without disconnection	IEC 60512-4, Test 6c	≤ 40 g; 6 ms; halfsine 12 shocks / direction in 3 axis	
Shock, without destruction	IEC 60512-4, Test 6c	200 g; 6 ms; halfsine 2 shocks / direction in 3 axis	
Contact force		20 ... 50 cN	

Switch	Function	
Card presence switch		normally open
Switch sequence	The card presence switch is activated after the data contacts have mated with the card pads and before the card reaches its final position. This sequence will take place for the minimum sized card pads (and larger) acc. to ISO 7816.	
Chattering time		≤ 5 ms

Termination		Suitable connector
Connector for flexprint No. of contacts 8 or 10		see page 29 «Accessories Flexprint Connectors»

Smart Card Connectors
with PCB Mount Wiping Contacts

Series C702E



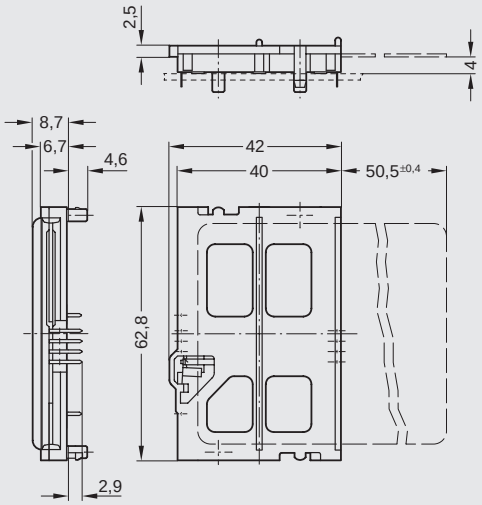
PCB Mount Wiping Contact Smart Card Connectors
Typical applications for Smart Card Connectors with wiping contacts and PCB mounting are set top boxes, toll road trans-poders, parking meters, utility metering systems, etc., where limited numbers of mating cycles are specified.

Design features
- Termination: dip solder pins or SMT
- self-cleaning card presence switch on most models detecting final card position
- special shape of wiping contacts minimize card scratching and wear
- Versions acc. to EMV (see page 6)
- dual plane version with 2 x 8 contacts for chip up & down card handling, suitable for applications with short dwell time of the card

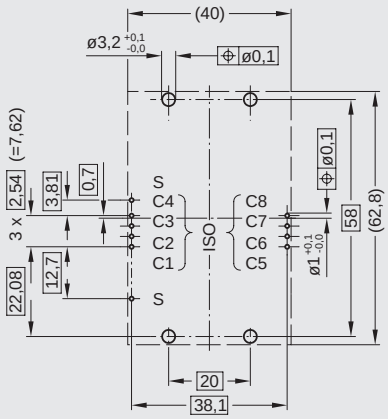
Assembly instructions:
Soldering conditions
- wave soldering: 260 °C; 10 s max.
- infrared reflow 230 °C; 30 s max. (SMT versions only)

C702E Smart Card Connectors with PCB Mount Wiping Contacts

Description	Contact position	Termination	Part No.
with board lock and self-cleaning switch, acc. to EMV	ISO	Dip solder pin	C702 10M008 272 4



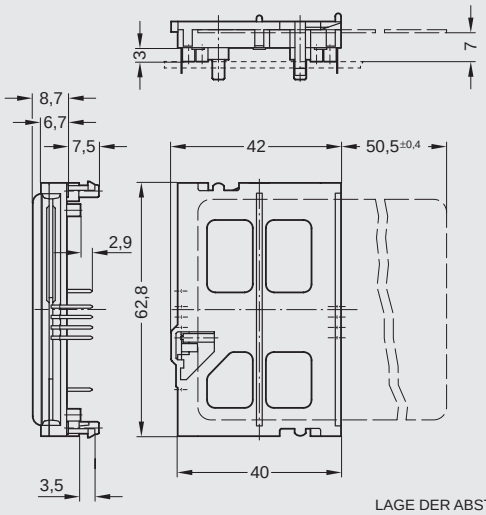
BESTÜCKUNGSSEITE / *COMPONENTS SIDE*



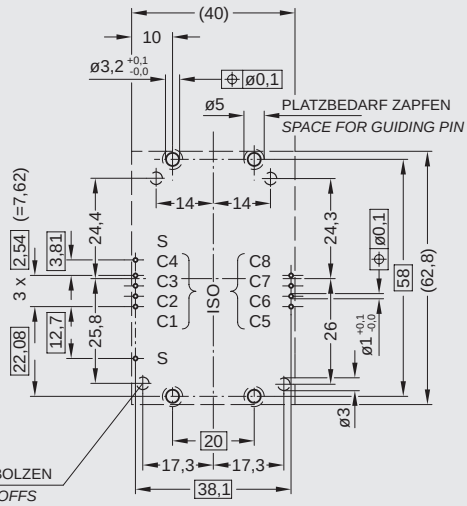
LEITERPLATTENDICKE / *PCB THICKNESS* = 1,4 - 1,68

C702E Smart Card Connectors with PCB Mount Wiping Contacts

Description	Contact position	Termination	Part No.
with board lock and self-cleaning switch and 3 mm stand-offs, acc. to EMV	ISO	Dip solder pin	C702 10M008 255 4



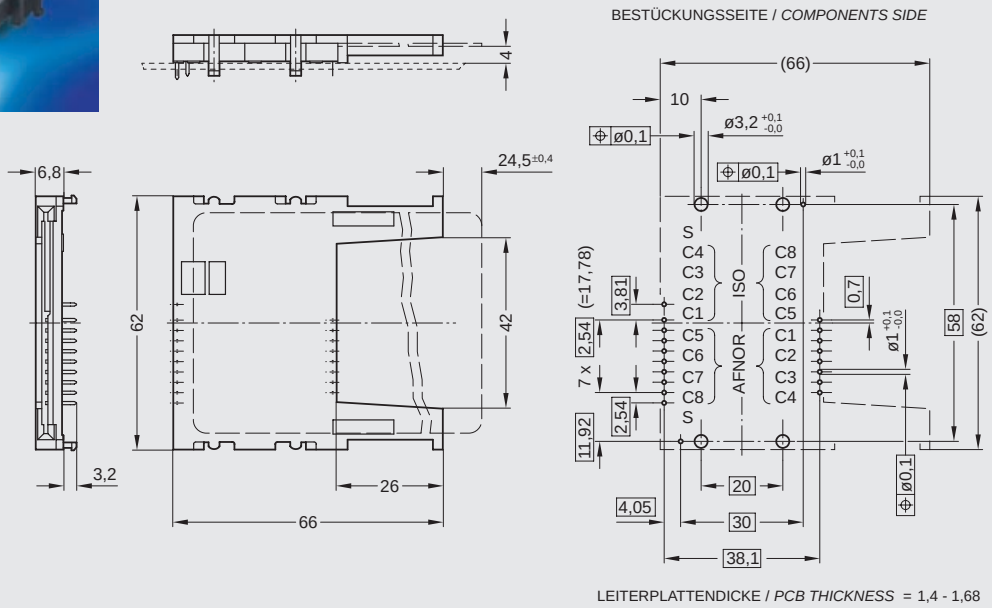
BESTÜCKUNGSSEITE / *COMPONENTS SIDE*



LEITERPLATTENDICKE / *PCB THICKNESS* = 1,4 - 1,68

C702E Smart Card Connectors with PCB Mount Wiping Contacts

Description	Contact position	Termination	Part No.
with board lock, self-cleaning switch and card guide	ISO	Dip solder pin	C702 10M008 226 4
	ISO + AFNOR	Dip solder pin	C702 10M008 235 4



C702E Technical Data

Electrical Characteristics	Standard	Value
Contact resistance without cable or flexprint	IEC 60512-2, Test 2a	Data contacts ≤ 30 mΩ Switch contacts ≤ 50 mΩ
Insulation resistance	IEC 60512-2, Test 3a	≥ 10^9 Ω
High voltage resistance	IEC 60512-2, Test 4a	500 V_{AC}; 1 min

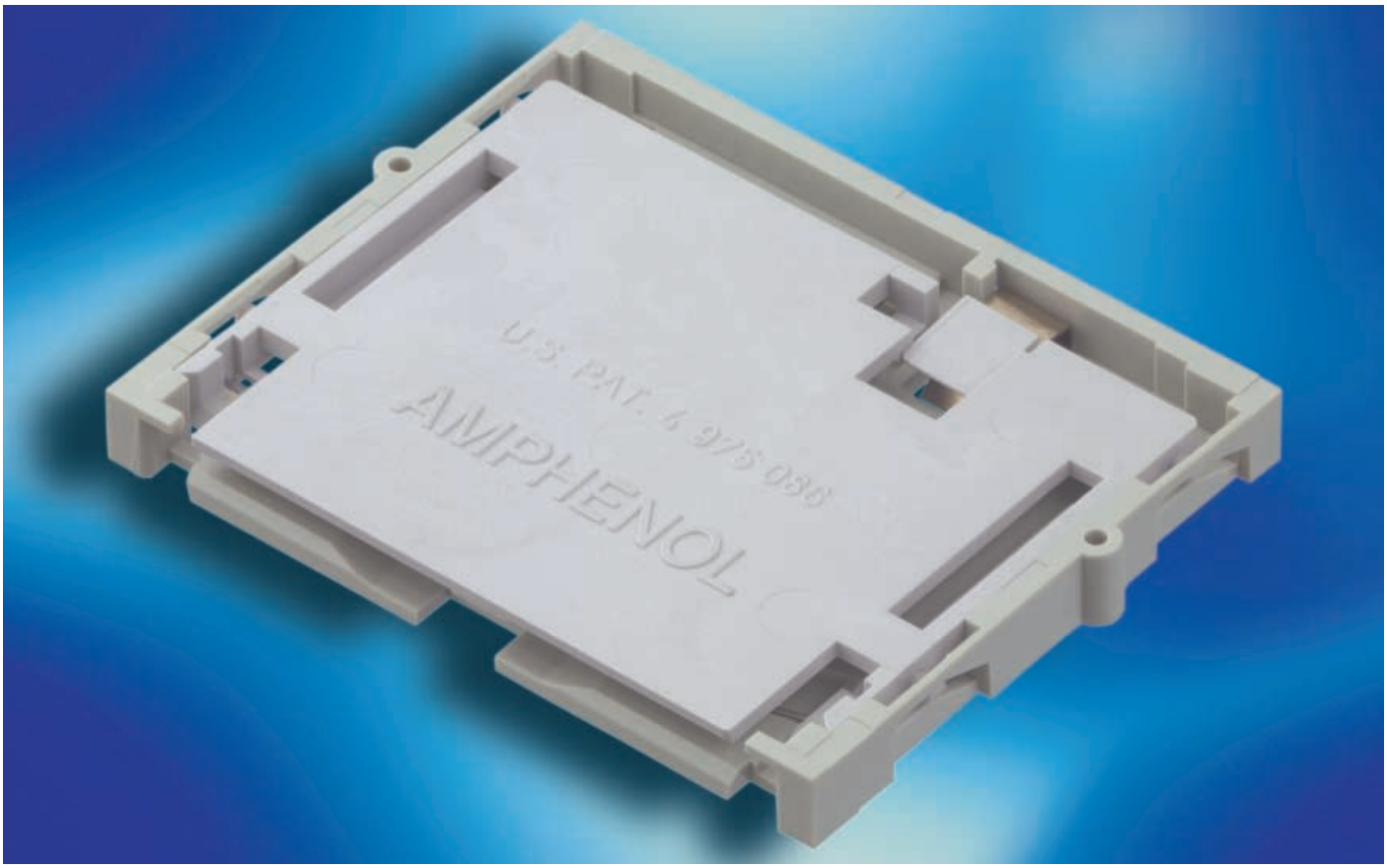
Climatical Characteristics		
Climatic category	IEC 60068-1	25 / 70 / 21
Operating temperature		- 25 °C ... + 70 °C
Storage temperature		- 40 °C ... + 85 °C

Mechanical Characteristics			
Card insertion force	IEC 60512-7, Test 13b	≤ 5 N	≤ 12 N at “dual plane“ 2 x 8 contacts
Card extraction force	IEC 60512-7, Test 13b	≥ 1 N	
Mechanical lifetime	IEC 60512-5, Test 9a (without corrosion stress)	100,000 mating cycles	
Vibration	IEC 60512-4, Test 6d	f = 10 ... 60 Hz 0,35 mm DA f = 60 ... 500 Hz a = 2.5 g 2 h / axis	
Shock, without disconnection	IEC 60512-4, Test 6c	≤ 40 g; 11 ms; halfsine 3 shocks / direction in 3 axis	
Shock, without destruction	IEC 60512-4, Test 6c	200 g; 6 ms; halfsine 2 shocks / direction in 3 axis	
Contact force		20 ... 50 cN	

Switch		
Card presence switch		normally closed
Switch sequence	The card presence switch is activated after the data contacts have mated with the contact field and before the card reaches its final position.	
Chattering time		≤ 5 ms

Smart Card Connectors
with landing card PCB Mount

Series C702F



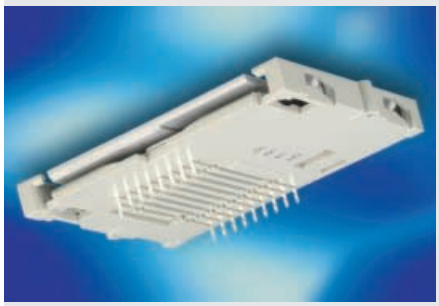
The Smart Card Connector with landing card. Typical applications are Point-of-Sale systems, mobile devices, access control etc.

Design features
- high number of mating cycles due to minimized wiping distance on card contacts
- contact self-cleaning effect
- short card insertion depth

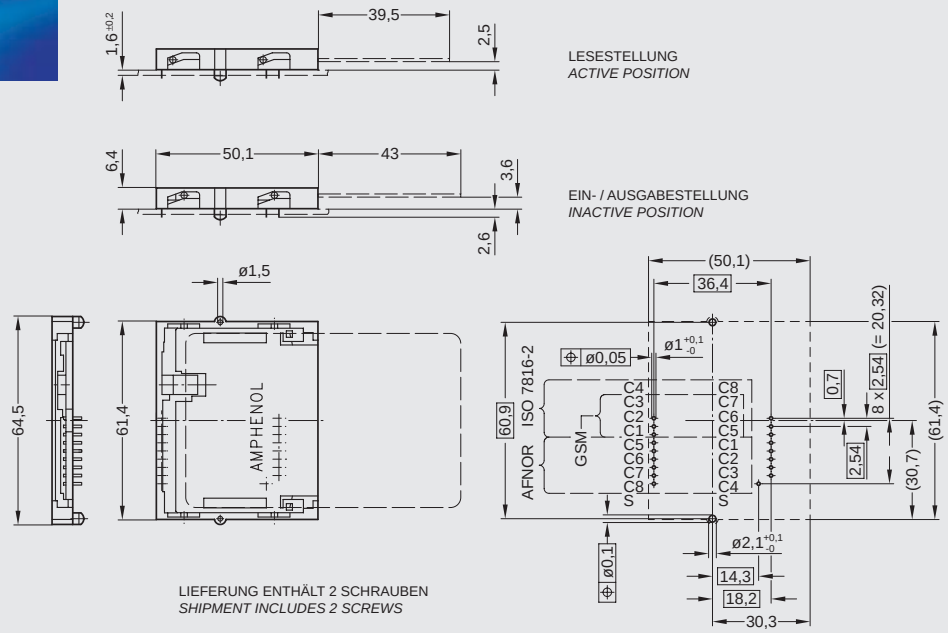
Assembly instructions:
For the provided Philip's head screws, a power driven screw driver (500-600 r/rpm; 0.25 Nm max.) is recommended.

Soldering conditions
Wave soldering: 260 °C, 10 s max.

C702F Smart Card Connectors with landing Card PCB Mount



Description	Contact position	Termination	Part No.
Landing card	GSM	Dip solder pin	C702 10M008 120 4
	ISO	Dip solder pin	C702 10M008 121 4
	AFNOR	Dip solder pin	C702 10M008 122 4
	ISO + AFNOR	Dip solder pin	C702 10M008 123 4



C702F Technical Data

Electrical Characteristics	Standard	Value
Contact resistance	IEC 60512-2, Test 2a	Data contacts ≤ 35 mΩ, Switch contacts ≤ 70 mΩ
Insulation resistance	IEC 60512-2, Test 3a	≥ 10^9 Ω
High voltage resistance	IEC 60512-2, Test 4a	500 V_{AC}; 1 min

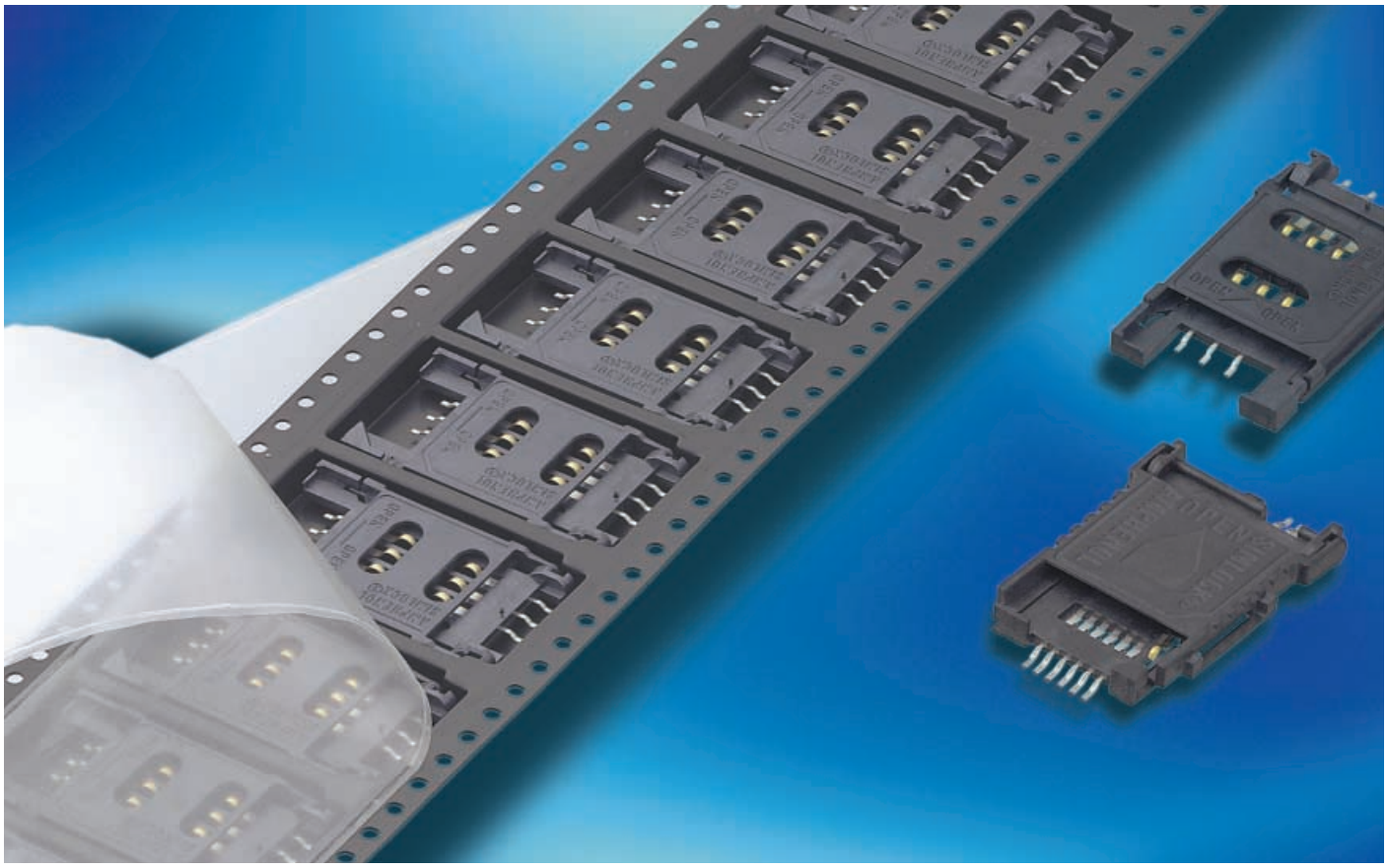
Climatical Characteristics		
Climatic category	IEC 60068-1	25 / 85 / 21
Operating temperature		- 25 °C ... + 85 °C
Storage temperature		- 40 °C ... + 85 °C

Mechanical Characteristics		
Card insertion force	IEC 60512-7, Test 13b	≤ 12 N
Card extraction force	IEC 60512-7, Test 13b	≥ 2.5 N
Mechanical lifetime	IEC 60512-5, Test 9a (without corrosion stress)	300,000 mating cycles
Vibration	IEC 60512-4, Test 6d	f = 10 ... 60 Hz 0.7 mm DA f = 60 ... 500 Hz a = 5 g 2 h / axis
Shock, without disconnection	IEC 60512-4, Test 6c	≤ 40 g; 6 ms; halfsine 3 shocks / direction in 3 axis
Shock, without destruction	IEC 60512-4, Test 6c	200 g; 6 ms; halfsine 2 shocks / direction in 3 axis
Contact force	–	20 ... 50 cN

Switch		
Card presence switch		normally open
Switch sequence	The card presence switch is activated after the data contacts have mated with the card pads and before the card reaches its final position. This sequence will take place for the minimum sized pads (and larger) acc. to ISO 7816	
Chattering time	–	≤ 5 ms

Smart Card Connectors
SIMLOCK®

Series C707A



6 contacts
Low Profile
with card
presence switch

Page 47

6 contacts
Low Profile

Page 47

with or without
locking detector
4 positioning pins

Page 48

with or without
locking detector
2 positioning pins

Page 48

SIMLOCK®
designed for SIM/SAM card applications.

Design features

- size: same footprint as SIM card
- reliable function in locked state during mobile use
- designer does not have to be concerned with housing tolerances and card guiding due to self contained system
- polarization notch does not allow incorrect card positioning
- SIMLOCK® with locking detector (or card presence switch) available
- suitable for automatic assembly processes (Pick & Place, Tape & Reel and Reflow)
- contact carrier and lid can be delivered separately upon request
- custom geometries and layout designs possible

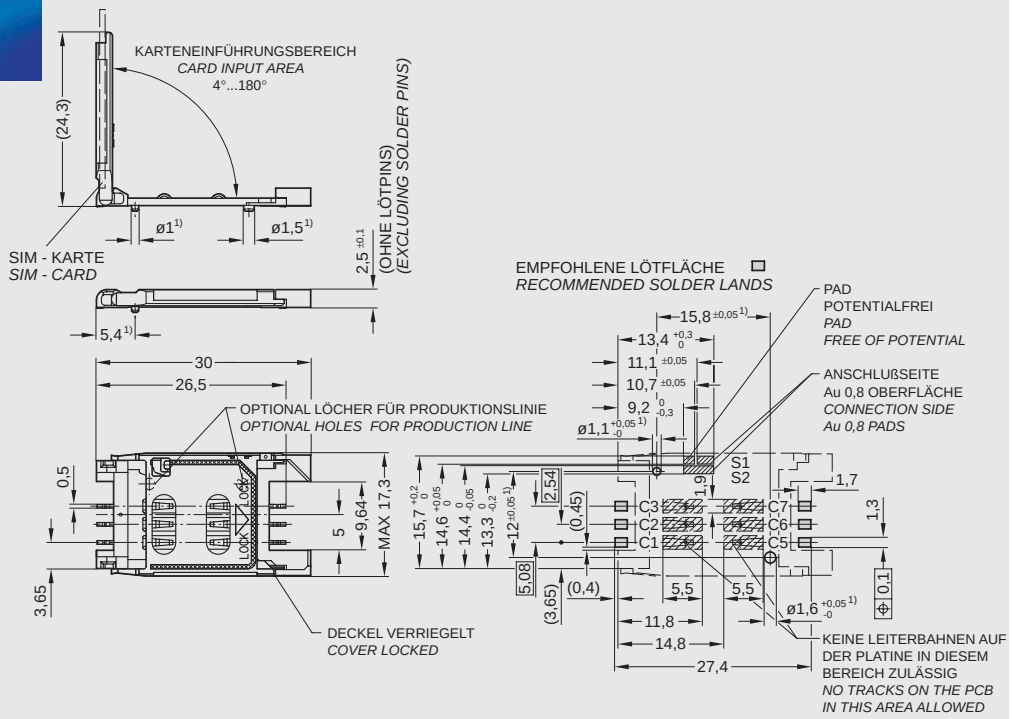
For your special requirements please contact Amphenol-Tuchel Electronics GmbH (see back page).

Assembly instructions:
Versions with locking detector lid must be unlocked during reflow process or lid can be packaged separately and snapped in place after reflow.

Soldering conditions:
Infrared reflow: 245°C; 10 s max.

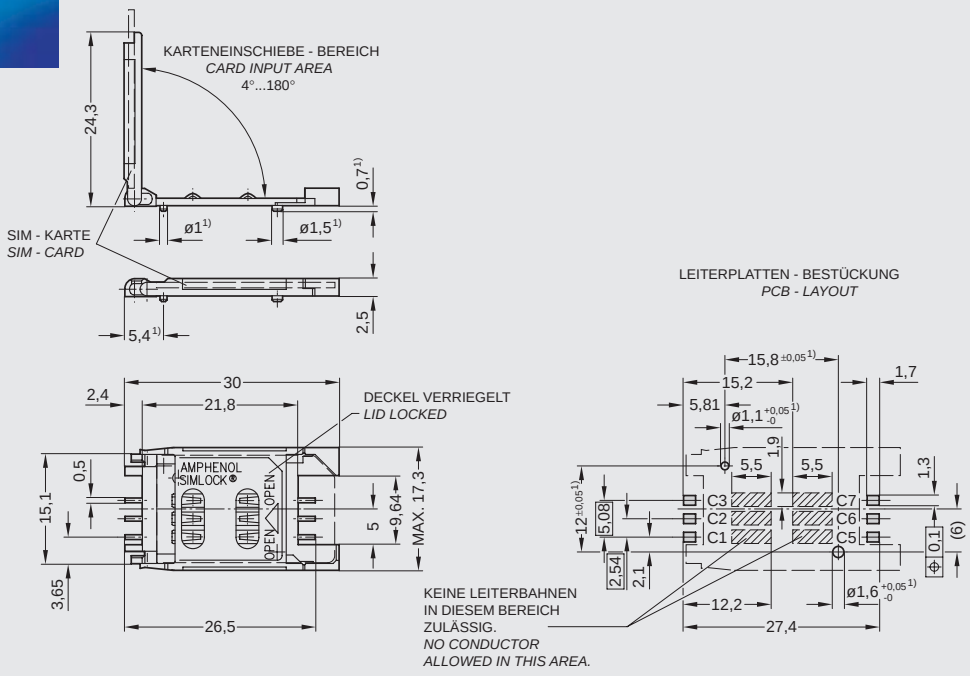
C707A Smart Card Connectors SIMLOCK®

Description	Packaging	Part No.
6 contacts (3+3), low profile, with card presence switch, without positioning pins	800 pieces on “Tape & Reel“ 20 mm pitch	C707 10M006 522 2
2 different positioning pins[1)]	800 pieces on “Tape & Reel“ 20 mm pitch	C707 10M006 523 2



C707A Smart Card Connectors SIMLOCK®

Description	Packaging	Part No.
6 contacts (3+3), low profile, 2 different positioning pins[1)]	800 pieces on “Tape & Reel“ 20 mm pitch	C707 10M006 049 2
6 contacts (3+3), low profile, without positioning pins[1)], index dimensions unnecessary	800 pieces on “Tape & Reel“ 20 mm pitch	C707 10M006 500 2



C707A Technical Data

Electrical Characteristics	Standard	Value
Contact resistance	IEC 60512-2, Test 2a	Data contacts ≤ 30 mΩ Switch contacts ≤ 60 mΩ
Insulation resistance	IEC 60512-2, Test 3a	≥ 10^9 Ω
High voltage resistance	IEC 60512-2, Test 4a	500 V_{AC}; 1 min

Climatical Characteristics

Climatic category	IEC 60068-1	40 / 85 / 21
Operating temperature		- 40 °C ... + 85 °C
Storage temperature		- 40 °C ... + 85 °C

Mechanical Characteristics

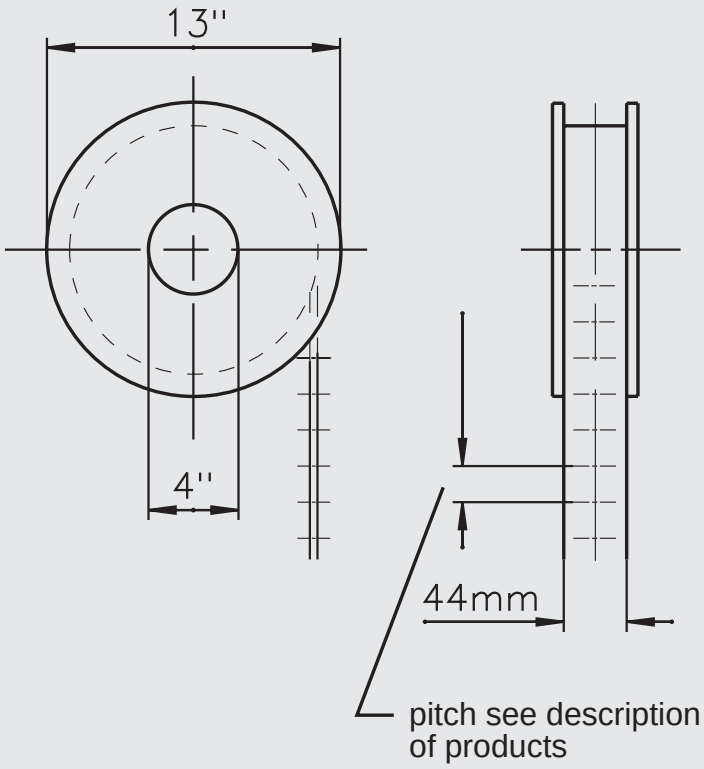
Lid locking force		4 ... 8 N
Mechanical lifetime	IEC 60512-5, Test 9a	5,000 operations
Vibration	IEC 60512-4, Test 6d	f = 10 ... 60 Hz 0.8 mm DA f = 60 ... 500 Hz a = 6 g 2 h / axis
Shock, without disconnection	IEC 60512-4, Test 6c	≤ 100 g; 6 ms; halfsine 100 shocks / direction in 3 axis
Shock, without destruction	IEC 60512-4, Test 6c	500 g; 1 ms; halfsine, 2 shocks / direction in 3 axis
Contact force		20 ... 50 cN

Switch

Security switch		closed, when lid locked
Chattering time		≤ 5 ms

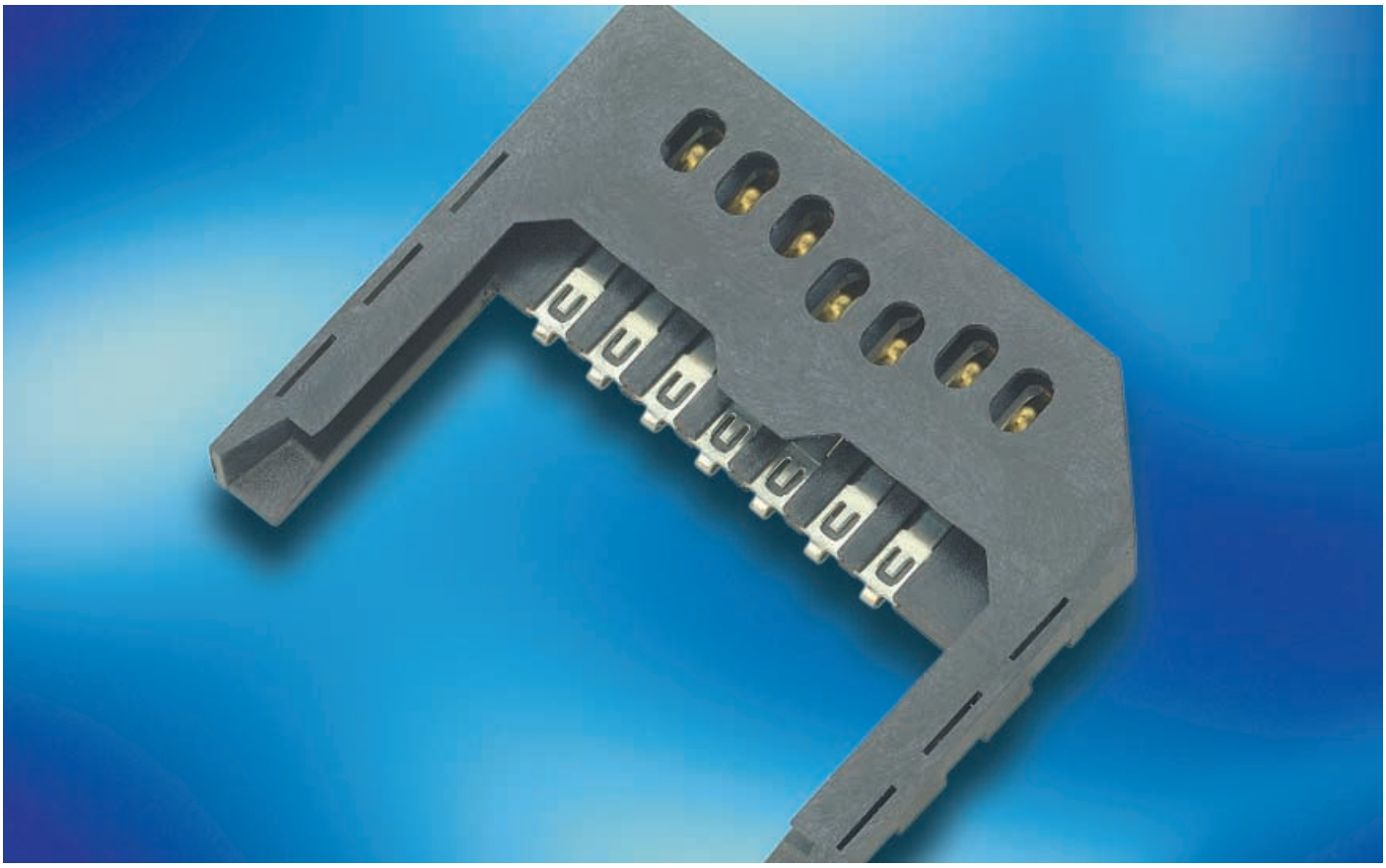
C707A Smart Card Connectors SIMLOCK®

"Tape & Reel" packaging for SIMLOCK®



MultiMediaCard Connector

Series C709A



The MultiMediaCard Connector (MMC) and the Secure Digital Memory Card Connector* (SD Card) are designed for attaching, fixing and electrically interconnecting the card to the system board. Most suitable applications are:

- Telecommunication
- Audio
- Video
- PC
- Consoles (video games etc.)
- Navigation
- Automotive
- Industry
- MP3 player

Design features

- minimized co-planarity tolerances due to advanced terminal design
- on board space saving due to termination geometry
- holes for mechanical and electrical contact tests
- customized fastening
- acc. to MMCA specification

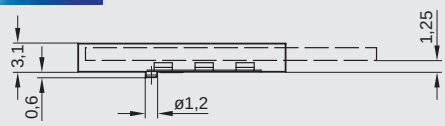
For realization of your custom requirements please use the Smart Card Connector competence and experience of our design engineers.

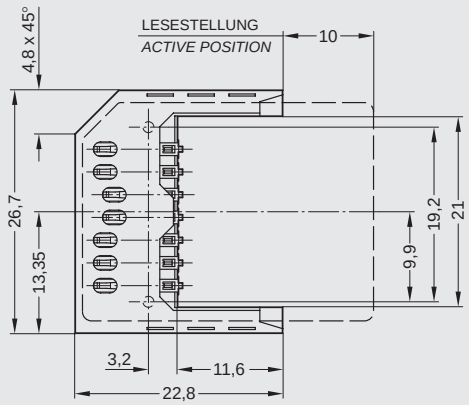
*) without picture

C709A MultiMediaCard Connector

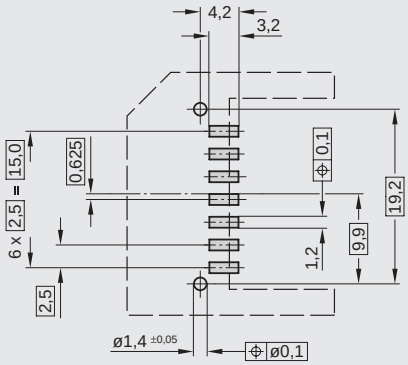
Description	Part No.
MultiMediaCard Connector	C709 10A007 100 1

Other designs and Secure Digital Card Connectors upon request.





LEITERPLATTEN - BESTÜCKUNG
PCB - LAYOUT



C709A Technical Data

Electrical Characteristics	Standard	Value
Contact resistance	IEC 60512-2, Test 2a	≤ 30 mΩ
Insulation resistance	IEC 60512-2, Test 3a	≥ 10^9 Ω
High voltage resistance	IEC 60512-2, Test 4a	500 V

Climatical Characteristics

Climatical category	IEC 60068-1	25 / 85 / 21
Operating temperature		- 25 °C ... + 85 °C
Storage temperature		- 40 °C ... + 90 °C

Mechanical Characteristics

Card insertion force	IEC 60512-7, Test 13b	max. 40 N
Card extraction force	IEC 60512-7, Test 13b	> 1 N
Mechanical lifetime		10,000 mating cycles
Random vibration	IEC 60512-6, Test 6e	f = 10 Hz ... 2 kHz a = 6 g RMS 15 min / axis
Shock, without disconnection	IEC 60512-4, Test 6c	40 g; 11 ms 100 shocks / direction in 3 axis
Shock, without destruction	IEC 60512-4, Test 6c	500 g; 1 ms 3 shocks / direction in 3 axis
Contact force		20 ... 60 cN
No. of contacts		7
Contacts	Wiping contacts with 2 premating contacts	
Termination	SMT	
Mounting style	upon customer request	

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Amphenol

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