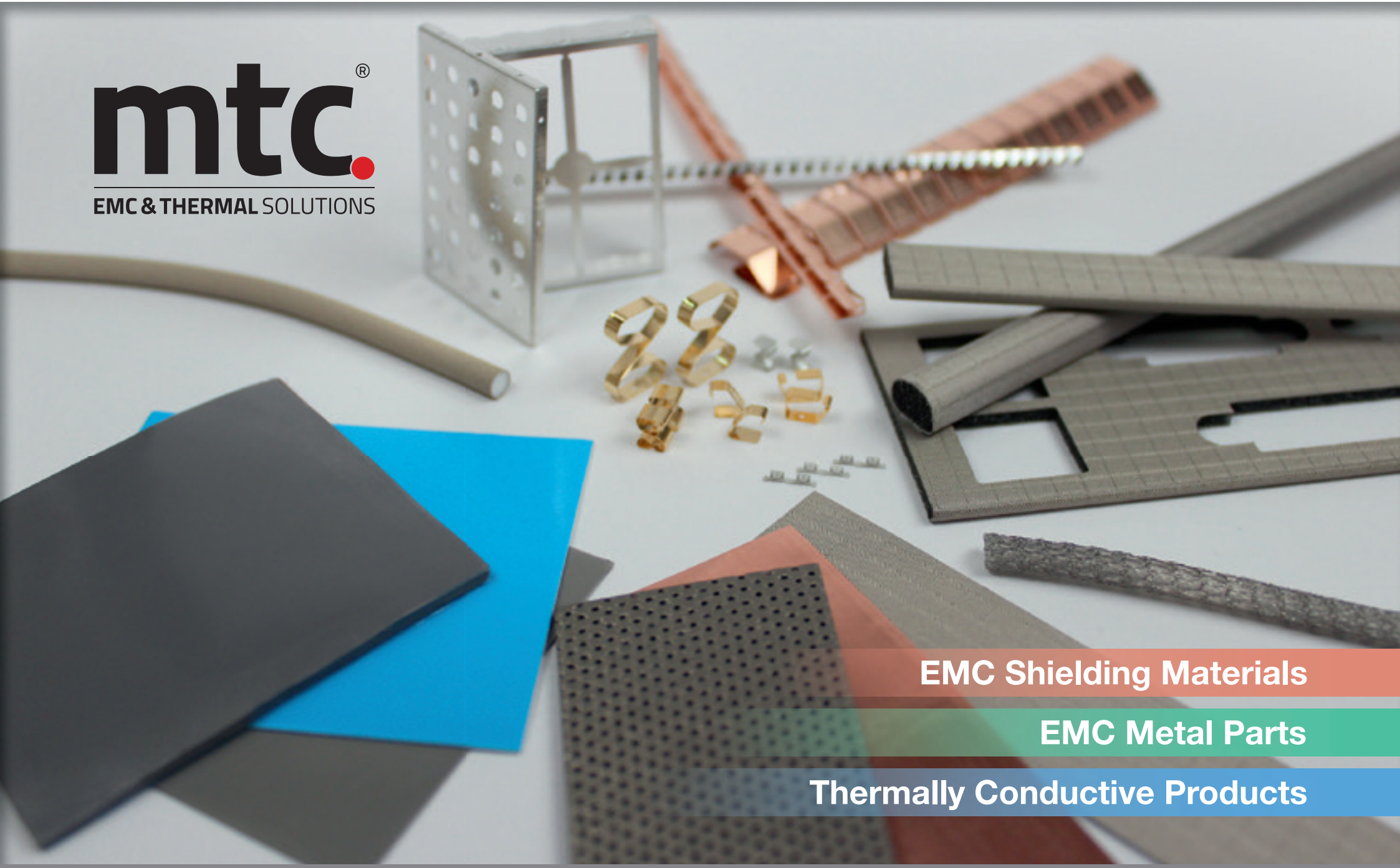
mtc®

EMC & THERMAL SOLUTIONS



EMC Shielding Materials

EMC Metal Parts

Thermally Conductive Products

MTC Micro Tech Components GmbH • Hausener Straße 9 • D-89407 Dillingen • Phone: +49 (0)9071 7945-0 • Fax: +49 (0)9071 7945-20 • www.mtc.de/en • info@mtc.de

Photo: Markus Schnitzler

Materials for electromagnetic shielding and heat dissipation

MTC Micro Tech Components GmbH in Dillingen (Bavaria) is a specialized manufacturer of various components and materials for the shielding of electromagnetic radiation and the dissipation of heat. ***mtc*** supplies worldwide customers of different industries such as automotive, avionics, medical, telecommunications and renewable energy.

As an expert and full-line supplier in the field of electromagnetic compatibility (EMC) and thermal management. ***mtc*** offers an extensive range of standard products as well as the development and production of individual solutions. ***mtc****'s* customers benefit from professional consulting and a first-class service and support.

Long-term experience through own production

In addition to the headquarter, ***mtc*** has production facilities in South Korea and Dillingen as well as a sales office in Hong Kong, from which the Asian region is served.

EMC Innovation was founded as a sister company of ***mtc*** in South Korea in 2005. Due to many years of experience in the own production of standard- and customized fabric over foam gaskets, ***mtc*** ensures highest quality and short response times. The delivery of the Asian customers is done locally by the ***mtc***-network.

International business and global support

In 2011 ***mtc*** and EMC Innovation joined the UK-based discoverIE Group plc (LSE: DSCV), an international group of businesses that designs, manufactures and supplies innovative components for electronic applications. The Group employs about 3.800 people and its principal operating units are located in Continental Europe, the UK, China, Sri Lanka, India and North America.

mtc and EMC Innovation are independent companies within the Group. Thanks to the synergies with other companies in the Group, e. g. Acal BFi, an European special distributor of electronics and photonics, ***mtc*** continues to strengthen its international presence in the future.

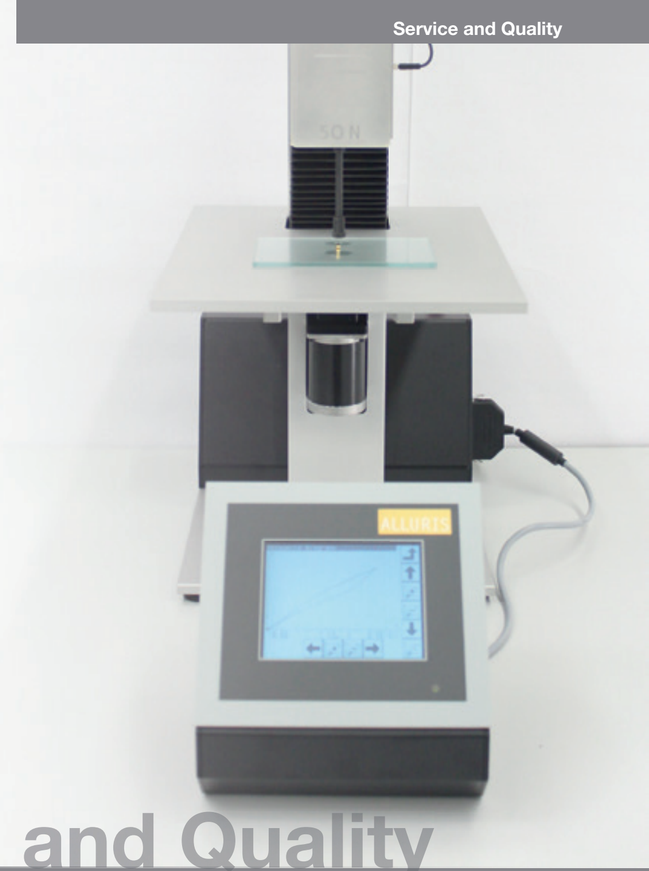
Corporate principles and social commitment

mtc sets a high value on good cooperation with its employees, customers and suppliers. Together a trustful coexistence is lived, which is characterized by reliability, loyalty and mutual respect – for long term business relationships and mutual success.

The social responsibility grows with the success of ***mtc***. With the production facility in Regens-Wagner Foundation in Dillingen ***mtc*** supports the inclusion of disabled people in daily work.

mtc is certified according to ISO 9001 and ISO 14001 and meets all requirements for an environmentally friendly business.

About us



As a specialized full-service provider of EMC shielding materials and thermally conductive products (TCP) ***mtc*** supports its customers from professional technical consulting to customer-specific development and intelligent logistics. For the past 25 years, ***mtc*** customers appreciate the consistently high product quality as well as the personal commitment and know-how of the ***mtc*** team.

- Excellent service
- High customer orientation
- Fast response times
- Fast sampling service
- Efficient in-house logistics

Permanent incoming and outgoing goods inspections as well as the certification according to ISO 9001 and ISO 14001 ensure the consistently high quality of ***mtc*** products. ***mtc*** has high-precision measuring, testing and control technology for mechanical and optical measurement of test pieces for material quality and size accuracy.

- Strict quality assurance at the production site and in-house
- High production quality
- Verification of simulation results
- Lifecycle and material tests
- Initial sample test reports

Service and Quality

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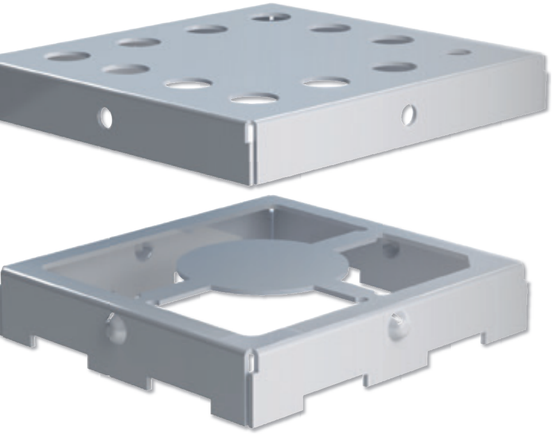
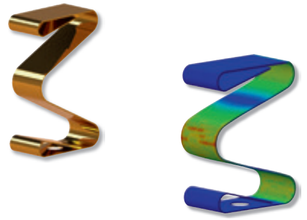


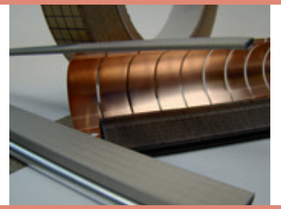


In addition to the extensive range of standard products ***mtc*** offers the complete development and production of individual customer solutions. With the aid of modern 3D technologies, ***mtc*** develops, designs and finalizes EMC and thermally conductive products according to customer's specifications. Our technical department is at your side – from the project idea to the design and the final series production.

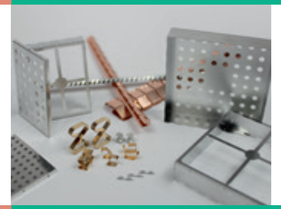
Design
- Concept development
- Design to application
- Documentation
- Close cooperation with the customer

FEA simulation
- Simulation studies
- Design evaluation during the development
- Design optimization

Technical Services



EMC Shielding Materials



EMC Metal Parts

Thermally Conductive Products

Photo: Markus Schmitzler

Company

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EMC Shielding Materials

Product Overview

EMC Metal Parts

Thermally Conductive Products

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mtc is an ISO 9001 and ISO 14001 certified company. This means assured quality and ecology-minded production processes

All products are RoHS compliant

All products are REACH compliant

UL 94 certified product

Custom length available

Optionally available in continuous length on roll

Optionally available with **W**ide **R**elease **L**iner

Optionally available with several items on shared carrier sheet (**S**heet **T**ype **P**ackage)

Features	ISO 9001 14001	RoHS	REACH	UL 94	TS TS	REEL	WRL	STP
Fabric-/foil over foam gaskets	✓	✓	✓	✓	✓	✓	✓	✓
Hollow chamber-, clip-on and EPDM-profiles	✓	✓	✓		✓	✓		
IP/EMC gaskets	✓	✓	✓		✓	✓		
Punched parts	✓	✓	✓	✓				
Conductive fabric and fleeces	✓	✓	✓		✓	✓		
Conductive elastomers	✓	✓	✓		✓	✓		
Knitted wire gaskets	✓	✓	✓		✓	✓		
Conductive foam	✓	✓	✓		✓	✓		
Conductive tapes	✓	✓	✓		✓	✓		
Contact springs	✓	✓	✓		✓			
SMD contact springs	✓	✓	✓			✓		
SMD contact pads	✓	✓	✓	✓		✓		
Board Level Shields (BLS)	✓	✓	✓			✓		
Thermally conductive products	✓	✓	✓	✓	✓	✓		✓

Features

General information on the product

Shielding properties

Tolerances

Material specifications and technical information

Material code

Fabric over foam gaskets also available in a halogen free version

Important information

Detailed information and datasheets on our website **www.mtc.de/en**

PLEASE NOTE

All data is provided for guidance only due to the varied conditions of potential use which are beyond our control. All recommendations or suggestions are given without guarantee or responsibility on our part and users should make their own test to determine suitability.

Dimensions in mm (unless otherwise stated).

Description of Icons

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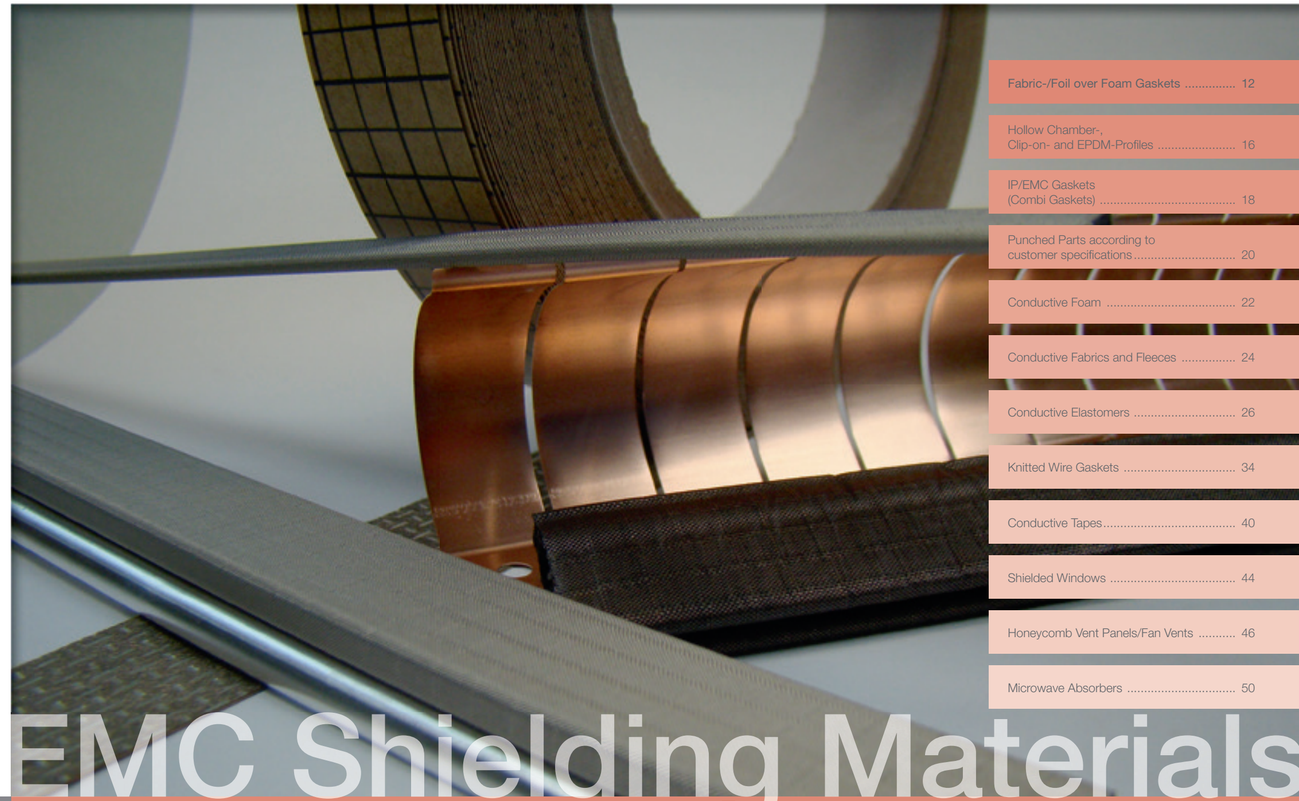
	Protection against EMI/RFI	Protection against EMI/RFI + environment (up to IP54)	Protection against EMI/RFI + environment (up to IP65)	Protection against EMI/RFI + pressure water (IP68)	Assembly on PCB	Protection against EMI/RFI + view into system	Protection against EMI/RFI + ventilation	Absorption
Fabric over Foam Gaskets	✓	✓			✓			
IP/EMC Gaskets (Combi Gaskets)	✓	✓	✓					
Electrically Conductive Foam	✓				✓			
Electrically Conductive Fabric	✓							
Electrically Conductive Elastomers	✓	✓	✓	✓				
Oriented Wires in Silicone	✓	✓	✓					
All Metal Mesh Gaskets	✓							
Knitted Wire Over Elastomer Gaskets	✓							

	Protection against EMI/RFI	Protection against EMI/RFI + environment (up to IP54)	Protection against EMI/RFI + environment (up to IP65)	Protection against EMI/RFI + pressure water (IP68)	Assembly on PCB	Protection against EMI/RFI + view into system	Protection against EMI/RFI + ventilation	Absorption
Electrically Conductive Tapes	✓				✓			
Shielded Windows	✓					✓		
Honey-comb Vent Panels/ Fan Vents	✓						✓	
Microwave Absorbers	✓		✓	✓	✓			✓
Contact Springs	✓				✓			
SMD Contact Springs	✓				✓			
SMD Contact Pads	✓				✓			
Board Level Shields	✓				✓			

EMI = **E**lectro**m**agnetic **I**nterference, RFI = **R**adio **F**requency **I**nterference

Application of EMC Gaskets



EMC Shielding Materials

Fabric-/Foil over Foam Gaskets

Fabric-/Foil over foam gaskets have a **polyurethane foam core** which is available in four different hardness values (32/45/70/150 kg/cm³). The foam core is covered either with conductive fabric (copper-nickel coated) or aluminium foil.

The ***mtc*** **standard portfolio** includes a large range of sizes and shapes. **Customized dimensions** can be supplied at low cost. The material can also be cut to length or modified according individual needs.

As standard the profiles are fitted with a **non-conductive adhesive tape**. The following other options are also available:

- conductive adhesive tape
- several adhesive tapes on a single profile
- adhesive tapes with removal aid (WRL)
- small parts assembled on carrier sheet (STP)

mtc gaskets offer the **following properties**:

- excellent shielding effectiveness (80-90 dB @ 100 MHz-18 GHz),
- easy processing,
- high abrasion resistance,
- low surface resistance (< 0,05 Ohm).

Regarding aluminium foil over foam gaskets small deformations on the edges develop during production. However, this has no effect on the functionality of the gaskets.

Fabric over foam gaskets are optionally available in a **halogen free version**. Halogen free gaskets have the same electrical properties as standard gaskets.

Detailed information are available on request.

Tolerances

Width and height	Tolerance
0,5 – 6,3	+/– 0,5
6,3 – 10,0	+/– 0,7
10,0 – 16,0	+/– 0,8
16,0 – 25,0	+/– 1,0
25,0 – 40,0	+/– 1,3
40,0 – 63,0	+/– 1,6

Length	Tolerance
5 – 150	+/– 0,8
151 – 300	+/– 1,3
301 – 1.200	+/– 2,5
1.201 – 1.750	+/– 4,7
1.751 – 2.300	+/– 6,4

Fabric-/Foil over foam gaskets provide the following advantages:

- Short delivery time
- CuNi coated fabric (standard), other coatings and aluminium foil available
- Foam available with different hardness values
- Non-adhesive tape as standard, other options on request
- Also available in a halogeen free version

Dimensions in mm (unless otherwise stated).

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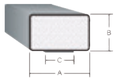
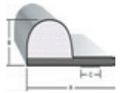


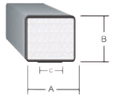
Rectangular profiles

Dim. A	Dim. B	Dim. C	Item number
3,0–58,0	0,5–30,0	1,5–55,0	DRE-AxB



P-shape profiles

Dim. A	Dim. B	Dim. C	Item number
8,0–29,0	3,0–10,0	3,0–25,0	DPT-AxB

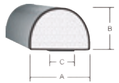


Square profiles

Dim. A	Dim. B	Dim. C	Item number
2,0–17,0	2,0–17,0	1,5–17,0	DQU-AxB

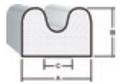
L-shape profiles

Dim. A	Dim. B	Dim. C	Item number
5,6	3,0	3,0	DLS-AxB



D-shape profiles

Dim. A	Dim. B	Dim. C	Item number
2,0–20,0	1,5–18,0	1,5–18,0	DHR-AxB



M-shape profiles

Dim. A	Dim. B	Dim. C	Item number
12,7	9,5	5,0	DMP-AxB

Knife-Edge-profiles

Dim. A	Dim. B	Dim. C	Item number
8,0–11,3	2,3–2,7	2,5–6,0	DKE-AxB

- Lower side adhesive tape positioning is also available.

Dimensions in mm (unless otherwise stated).

Fabric-/Foil over Foam Gaskets

Type 1

C-shape profiles

Dimension A	Dimension B	Dimension C	Item number
6,0–10,7	3,5–9,8	2,5–5,0	DCW-AxB

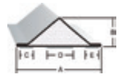
- With PET insert

Type 2

Dimension A	Dimension B	Dimension C	Item number
11,0–14,7	11,0–17,9	5,0–6,0	DCW-AxB

- Without PET insert

Type 1



Triangular profiles

Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Item number
9,1–10,0	2,3–3,5	2,5	2,5	2,5	DTR-AxB

Type 2

Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Item number
10,0–12,7	3,2–4,5	2,5–3,0	2,5–4,5	2,5–3,0	DTA-AxB

- Adhesive tape D is electrically conductive.
- Optimal for use with µTCA & ATCA plug-in modules.

Dimensions in mm (unless otherwise stated).

Optional HF halogen free

www

- Other dimensions on request
- Fabric over foam gaskets are also available in a halogen free version
- Detailed information on our website www.mtc.de/en

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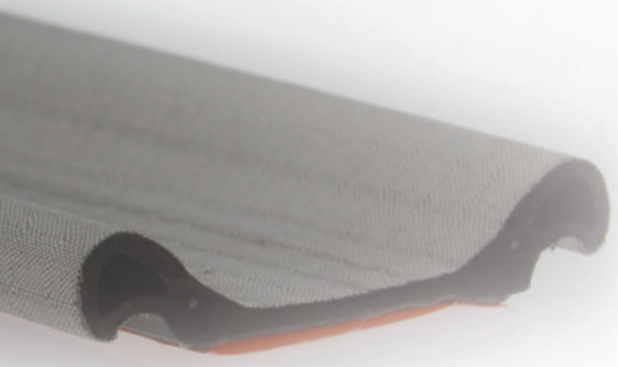

In addition to standard EMC gaskets with foam core, ***mtc*** also supplies **hollow chamber-, clip-on and solid profiles** based on EPDM/rubber. These profiles are especially used in control cabinet doors.

The core of the hollow chamber and clip-on/edge protection profile is made of **expanded rubber** and is covered with **copper-nickel fabric** as standard. A (partial) coating with other metallized fabric or aluminium foil is available on request.

Hollow chamber profiles can be supplied **with or without adhesive tape**. They are also available with several adhesive tapes for special applications.

Clip-on/edge protection profiles have an **integrated loop tape** and a U-shaped section. They are extremely flexible and are installed by simply being pressed by hand on the coating edges. The profiles adhere by a clamping effect. No adhesive is required. They are weatherproof and resistant to a temperature range from approx. -25°C to approx. 80°C.

The profiles can be supplied in **any lengths** and also **on rolls**. ***mtc*** can provide short delivery times for clip-on/edge protection and hollow chamber profiles from the standard product range. If you require specific widths and heights or cross sections which must be produced using special tools, a minimum purchase quantity has to be kept.

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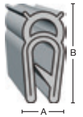
Hollow Chamber-, Clip-on- and EPDM-Profiles

Hollow chamber-, clip-on- and EPDM-profiles provide the following advantages:

- Short delivery time
- Rubber with CuNi coated fabric (standard), other coatings and aluminium foil available
- Hollow chamber profiles can be supplied with or without adhesive tape



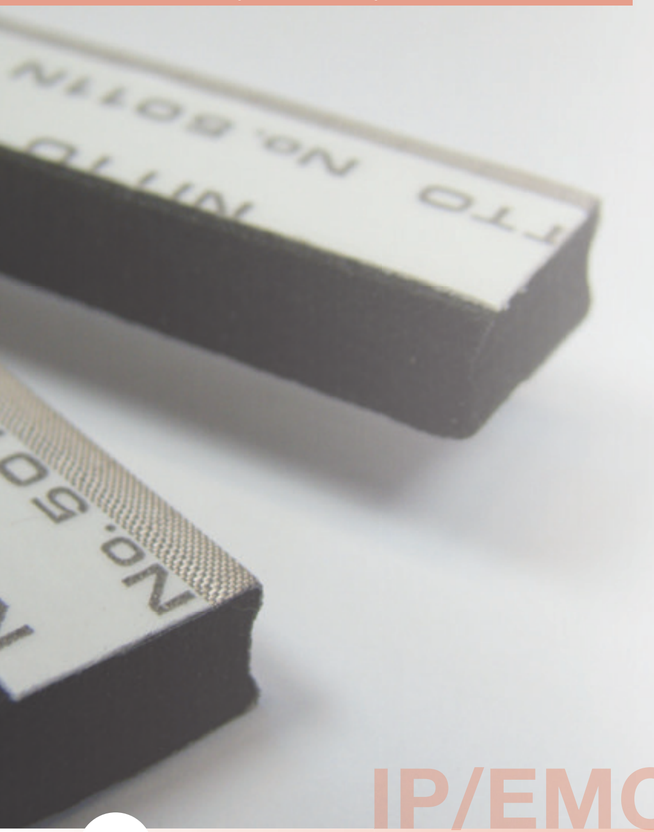
Clip-on profiles

Dimension A	Dimension B	Item Number
8,0	16,0	DAU-BxA

- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Hollow Chamber-, Clip-on- and EPDM-Profiles

Dimensions in mm (unless otherwise stated).



In addition to EMC and ESD shielding, **protection against environmental** influences is often also required. This can be achieved by using so-called **IP/EMC gaskets (combi gaskets)**, which are mainly used in outdoor areas to protect against moisture, dirt etc.

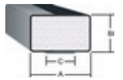
Depending on the design situation of the housing or control cabinet there are the following possibilities to achieve an IP/EMI protection:

- use of separate gaskets for EMC and IP (Intrusion Protection) or
- use of combi gaskets

A range of core materials (for example EPDM, expanded rubber, NBR, etc.) in a variety of hardness values are available for IP/EMC gaskets. The core of the profile can be **partially or completely coated** with **conductive copper-nickel** (CuNi) **fabric** or **aluminium foil**. The gaskets are supplied **with** or **without adhesive tape**. Custom-specific profiles can easily be manufactured.

Combi gaskets provide the following advantages:

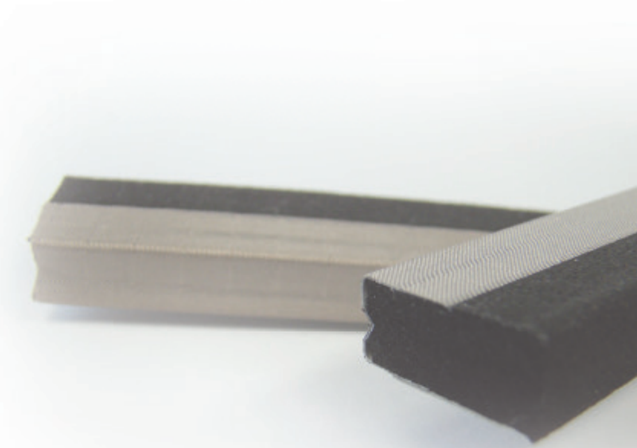
- Short delivery time
- Partially coated EMI gaskets available for combined IP- and EMI protection
- Available with adhesive tape, also several adhesive tapes possible
- CuNi coated fabric (standard), other coating and aluminium foil on request



Combi gaskets

Dim. A	Dim. B	Dim. C	Item number
12,0	6,0	5,0	DKO-AxB

- Other dimensions on request
- Detailed information on our website www.mtc.de/en



Dimensions in mm (unless otherwise stated).

IP/EMC Gaskets (Combi Gaskets)

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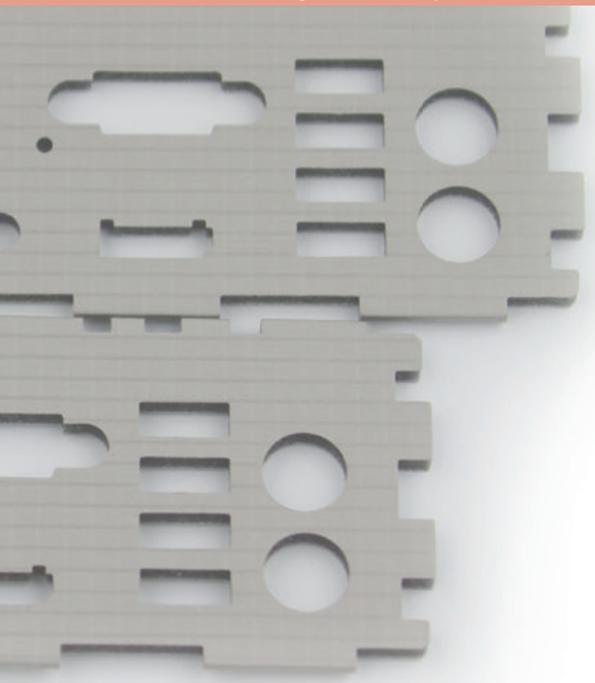


ISO 9001 14001 | RoHS ✓ | REACH ✓ | UL 94

A modern and flexible production enables to process the ***mtc*** standard products according to your need:

- gaskets for D-Sub connectors
- gaskets for USB connectors
- gaskets for RJ-45 connectors
- gaskets for I/O connectors
- custom-specific punched parts

Punched parts can be supplied in a range of materials. The following **base materials** are available:

- metal-coated fabrics and fleeces
- foam covered with conductive fabric or aluminium foil
- copper- and aluminium tapes
- conductive silicone sheets
- completely conductive foam

Punched parts made **of copper/aluminium tapes** are available on roll.

The distance from the edge of the hole to the edge of the gasket should be **minimum the thickness of the material**.

Optional HF halogen free

Punched parts provide the following advantages:

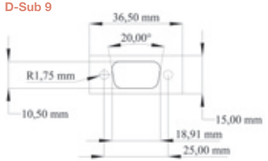
- Short delivery time
- Standard sizes for D-Sub plug connectors
- Customized sizes and cutouts available
- Tooling on the basis of CAD data or drawings
- Optimal for electronic connector panels and I/O-shields, e.g. compliant to ATX- or BTX-standard

Tolerances

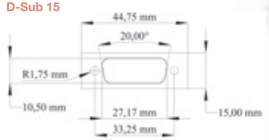
Basic size	Tolerance
Position and shape of punching	+/– 0,5
Shape of gasket	+/– 0,5
Length < 500	+/– 1,0

Standard gaskets for D-Sub

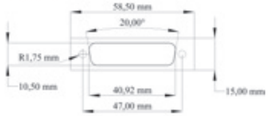
D-Sub 9



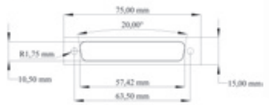
D-Sub 15



D-Sub 25



D-Sub 37



www

- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Punched Parts according to customer specifications

Dimensions in mm (unless otherwise stated).

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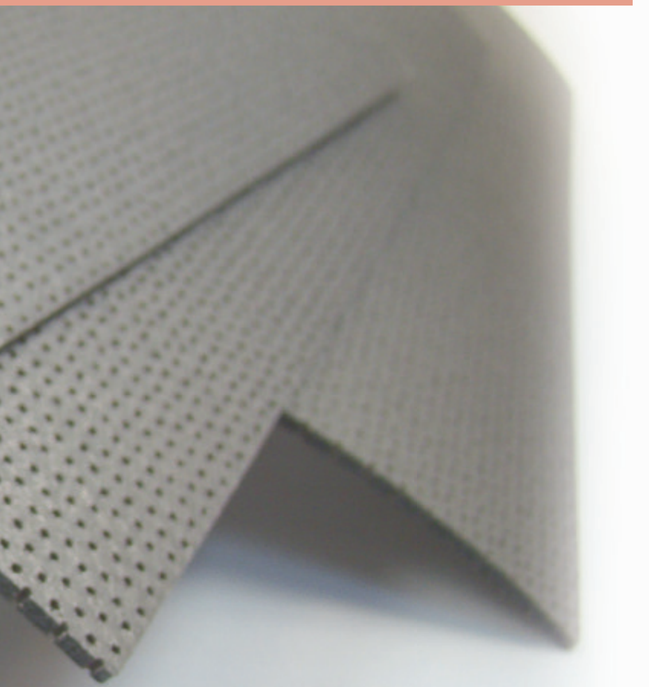

Conductive Foam

Conductive polyolefin foam gaskets are perforated at variable intervals before being metal coated in metal baths. This completely saturates the foam and makes it fully conductive whereby a **good conductive connection** between the top and bottom is ensured.

The seals have **excellent EMC properties** as a result of the small distance between the holes. Due to an improved Z-axis conductivity, the shielding properties can be increased to over 90 dB.

Conductive foam gaskets are available in **thicknesses from 0,3 to 1,5 mm** and can be supplied with a **copper-nickel metal coating**. They can be used in a temperature range of **approx. -10°C to approx. 80°C**.

Foam gaskets can be supplied either as **thin panels** which are ideal for shielding large areas, or as **customized stampings** for I/O shielding.

In addition to a large section of standard dimensions foam gaskets can also be offered according to **customer specifications**.

In addition, a conductive foam is available in thicknesses of 1,4 an 2,4 mm, which is **certified according to UL94 V-1**.

Tolerances

Basic size		Tolerances
Width		+/– 0,5
Height	0,3 – 1,0	+/– 0,1
	1,5	+/– 0,3

Conductive Foam

Width W	Thickness T	Item number
1000,0	0,3 – 1,5	RCF-WxT
1000,0	1,4 and 2,4	RCFH-V1-BxD

Conductive foam provides the following advantages:

- Flexible and inexpensive solution for contacting areas
- Available with customized cutouts
- Thickness range from 0,3 to 2,4 mm
- CuNi metallized
- Available with conductive tape

- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

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Conductive Fabrics and Fleeces

Conductive fabrics and fleeces are excellent for shielding entire rooms. They are also used as shielding component concerning EMC gaskets and EMC tapes.

Conductive fabrics and fleeces provide **excellent attenuation properties**. Since this is a very **lightweight** and **robust material**, it also features **extremely high flexibility**.

The basic material of fabrics and fleeces is **100% polyester**.

The following metal coatings can be supplied:

- copper/nickel (CuNi)
- silver/copper (AgCu)

Depending on costumer requirements, fabrics and fleeces can be offered with **conductive** or **non-conductive adhesive tape**.

Delivery forms are:

- on roll up to a width of 1.070 mm
- on roll as tape (with electrically conductive adhesive) in standard or customer-specific width

Conductive Fabrics and Fleeces

Coating	Special Features	Item number
CuNi	Fabric, rip stop	RGW-WR-260-PCN
CuNi	Fabric, coating (ATU), rip stop	RGW-WR-260-PCN(ATU)
CuNi-Co	Fabric, for better attenuation at low frequences	RGW-WD-250-NICO
CuNi	Fabric	RGW-W-290-PCN
CuNi	Fabric, very thin	RGW-WPD-300-PCN
CuNi	Fleece	RGW-NW-50-PCN
CuNi-Sn	Mesh, black surface	RGW-M-80-PCNR

Conductive fabrics and fleeces provide the following advantages:

- CuNi or AgCu coated fabric (standard), other coatings, densities and knitting types available
- Optionally available with conductive or non-conductive adhesive tape and cut to rolls

- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Conductive Fabrics and Fleeces

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Conductive Elastomers

Constant conductive elastomers

Constant conductive elastomers are gaskets for highest demands which are ideally suited for military and industrial applications. They consist of **silicone** and a homogeneous mixture of **electrically conductive** filling materials.

If electrically conductive elastomers must be resistant against aggressive substances like hydraulic oils and kerosene, it is recommended to use **fluor silicone** as elastomer.

In addition to the excellent electrical properties, these gaskets offer the **highest** protection against humidity and dirt (up to IP68).

Stamped parts or moulded parts are produced according to customer needs.

Conductive coated silicone

Silicone cords with an electrically conductive coated skin include a number of very soft gaskets with good shielding properties.

No electrically conductive fillers are used for the sealing core resulting in ideal properties concerning pressure and resistance to age. The **excellent electrical conductivity** is ensured by the coated skin that consists of silver/copper filled silicone.

The core either consists of **foamed silicone profiles** or **extruded silicone profiles** with shore hardnesses between 20 and 60 Shore A. Depending on the material thickness, other shore hardnesses are also possible.

Oriented wires in silicone

Wires in silicone are a gasket material consisting of **fine monel- or aluminium wires**. The wires are vulcanized vertically to the surface in foamed, solid or soft silicone.

This sealing material is characterized by **high mechanical strength and elasticity**.

Up to 140 points of contact/cm² ensure **best contacting** of the gasket with other metal surfaces.
The sealing material can be mounted with conventional silicone adhesive (e. g. Momentive RTV103Q-732).

In addition to the elastic EMI/RFI shielding the material offers an **excellent dust and splash water protection**. Solid silicone, used with the right contact pressure, meets the requirements according to **IP 65**. If it is possible that the seal also comes into contact with aggressive fluids like hydraulic oil, kerosene, etc., it is advisable to use **fluor silicone**.

Too much compression, when the gasket is mounted in a groove, can result in deformation of the wires.

Conductive Elastomers

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Constant conductive elastomers

Fillers

Material	
Carbon (C)	mainly for static discharge, best temperature resistance (225°C), best cost/performance ratio
Nickel plated graphite (NIC)	used when a high corrosion protection is required, good shielding properties, inexpensive
Silver plated copper (AGCU)	excellent shielding properties
Silver plated aluminium (AGAL)	very good shielding properties, good corrosion resistance

Material specifications

Material	Shore hardness (Shore A)	Resistivity max. (Ω*cm)	Shielding effectiveness (dB)				Temperature max. (°C)	Elasticity min. (%)	Specific weight (g/cm³)
			100MHz	600MHz	2GHz	10GHz			
C	60–80	2	30	30	20	NA	–60 to 225	120	1,18
NIC	60 +/– 5	0,05	111	112	111	110	–55 to 160	450	2 +/– 0,1
AGCU	65 +/– 5	0,004	107	105	105	107	–55 to 125	480	3,5 +/– 0,1
AGAL	60 +/– 5	0,008	109	114	101	102	–55 to 160	310	2 +/– 0,01

Tolerances

Extruded material	Tolerance
< 2	+/– 0,10
2–5	+/– 0,15
5–9	+/– 0,20

Sheet material		Tolerance
Thickness	< 2	+/– 0,15
	> 2	+/– 0,25
Length/ width		+/– 0,80
Centre of hole		+/– 0,40

Recommended contact pressure

Sheet material and punched parts:

- 6–10% of material thickness

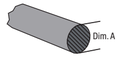
Extruded profiles:

- 10–25% of the diameter respectively of the material thickness

Dimensions in mm (unless otherwise stated).

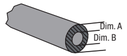
Constant conductive elastomers

Solid round cords (RV)



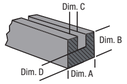
Dim. A	Item number
1,0–6,3	SRV-A

Hollow round cords (RH)



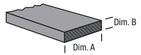
Dim. A	Dim. B	Item number
1,2–9,0	0,5–5,0	SRH-AxB

U-shape profiles (UP)



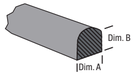
Dim. A	Dim. B	Dim. C	Dim. D	Item number
2,54–8,31	2,54–5,94	0,86–1,57	0,84–1,57	SUP-AxB

Rectangular profiles (RE)



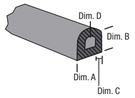
Dim. A	Dim. B	Item number
1,6–25,4	1,07–6,35	SRE-AxB

Solide D-shape profiles (DV)



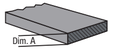
Dim. A	Dim. B	Item number
1,40–4,52	1,63–4,45	SDV-AxB

Hollow D-shape profiles (DH)



Dim. A	Dim. B	Dim. C	Dim. D	Item number
3,96–12,37	3,96–8,23	1,14–2,03	1,98–6,20	SDH-AxBxC

Sheet material



Dim. A	Item number		
	150 x 150	250 x 300	300 x 300
0,5–3,2	SPL-150x150xA	SPL-250x300xA	SPL-300x300xA

- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

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Conductive coated silicone

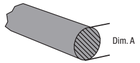
Material specifications

		Foam cord	Solid cord	Hollow cord
Shore hardness (Shore A)		20–35	60	60
Density (g/cm³)		0,6–1,8	1,2–2,3	1,2–1,4
Temperature range (°C)		–55 to 125	–55 to 125	–55 to 125
Elongation at break (%)		> 40	> 40	> 40
Compression test (70 h @ 100°C)		< 40	< 35	< 35
Coating material		silver/copper	silver/copper	silver/copper
Volume resistivity (Ω*cm)		0,008	0,008	0,008
Shielding effectiveness (dB)	H-field 10 KHz	72	67	60
	E-field 1 MHz	115	130	100
	P-field 1 GHz	85	110	90

Dimensions in mm (unless otherwise stated).

Conductive coated silicone

Round cords with silicone foam

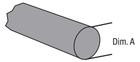


Dim. A	Item number
1,5–6,0	SDA-A

Tolerances

Width and height	Tolerance
1,5–2,4	+/– 0,2
2,5–4,7	+/– 0,3
4,8–6,0	+/– 0,4

Solid silicone cords

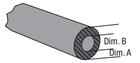


Dim. A	Item number
1,2–5,5	SDB-A

Tolerances

Width and height	Tolerance
1,2–2,7	+/– 0,2
2,8–4,9	+/– 0,3
5,0–5,5	+/– 0,4

Hollow cords



Dim. A	Dim. B	Item number
1,3–5,8	0,5–2,0	SDC-AxB

Tolerances

Width and height	Tolerance
1,3–2,5	+/– 0,2
2,6–5,7	+/– 0,3
5,8	+/– 0,4

- Other dimensions on request
- Detailed information on our website www.mtc.de/en

Dimensions in mm (unless otherwise stated).

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Oriented wires in silicone

Material specifications

	Sponge silicone	Solid silicone	Soft silicone
Metal wires	Monel/Aluminium	Monel/Aluminium	Monel/Aluminium
Wire density (wires/cm²)	100	140	100
Temperature range (°C)	–60 to 200	–60 to 200	–60 to 200
Colour	light grey	light grey	light grey
Available with fluorosilicone	---	✓	✓

Monel (MO):
Ø 0,11 ± 0,01 mm according to QQ-N-281-B

Aluminium (AL):
Ø 0,13 ± 0,01 mm according to AMS-4182
Alloy 5056

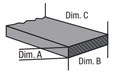
Shielding properties (dB)

	10 KHz	100 KHz	1 MHz	100 MHz	1 GHz	10 GHz
MO	55	72	138	125	108	60
AL	41	64	138	100	98	48

Conductive Elastomers

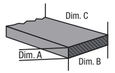
Oriented wires in silicone

Wires in spone silicone



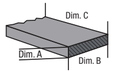
Dim. A	Dim. B	Dim. C	Item number
1,6–3,2	2,4–114	max. 900	OWS-AxB-XX-SSP

Wires in solid silicone



Dim. A	Dim. B	Dim. C	Item number
0,8–3,2	2,4–225	max. 900	OWS-AxB-XX-SSL

Wires in soft silicone



Dim. A	Dim. B	Dim. C	Item number
0,8–3,2	2,4–225	max. 1000	OWS-AxB-XX-SSS

- Other dimensions on request
- Detailed information on our website www.mtc.de/en

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Knitted Wire Gaskets

All metal mesh gaskets

All metal mesh gaskets consist of knitted metal wires and can be formed to several shapes. The following shapes have developed to a sort of standard:

- round profiles
- round core with fin
- rectangular profiles
- double round core with fin

Standard **metal wires** are:

- FCS (tin plated copper clad steel)
- monel (alloy of nickel and copper)
- stainless steel
- aluminium

FCS provides very good shielding attenuation, also in the magnetic field.

Monel is characterized by a very good shielding attenuation in combination with a high corrosion resistance.

To prevent galvanic corrosion, engineers should take notice of the **electrochemical potential** of the wire in combination with the metal used for the chassis, enclosure etc.

Due to flexible manufacturing processes, **customized dimensions** can be realized. Knitted wire material can also be supplied as **flat band material** with a thickness of approximately 0,5 mm and standard widths from 6,4 to 31,3 mm.

All metal mesh gaskets are normally very hard and only recommended for single use.

Knitted wire over elastomer

If the application requires a higher gasket elasticity, a gasket with an elastomer core should be chosen. Those gaskets consist of an elastomer core **that is covered with metal wire**. **Two layers** are standard, however, it is also possible to use one layer or more layers.

The elastomer material is mainly **neoprene foam, EPDM foam, PU foam** or **silicone foam**. The gaskets only provide little protection against environmental influences such as dust and circulating air. A protection against water (splashing water etc.) is not possible.

In some cases it is necessary to use a very soft gasket. This can be realized by knitting just **one layer** of a very fine metal wire over a **PU foam**.

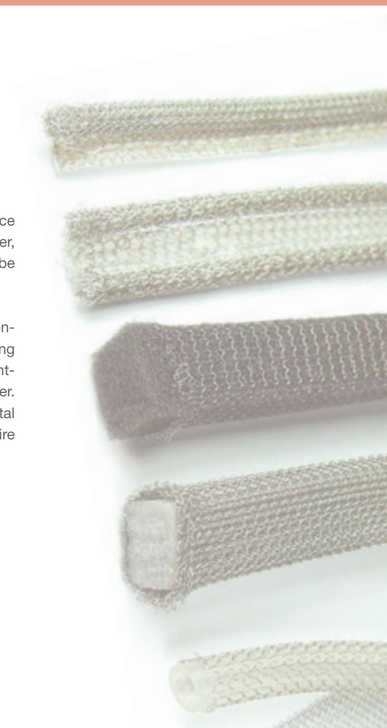
Knitted wire gaskets provide the following advantages:

- Very good price/performance ratio (all metal mesh gaskets)
- High flexibility (knitted wire over elastomer)
- Combined IP-/EMI protection (combi gaskets)

Combi gaskets

If the application requires a resistance against dropping or splashing water, a so-called **combi gasket** should be chosen.

These gaskets consist of a non-conductive elastomer with PSA backing and a knitted wire gasket that is mounted alongside the edge of the elastomer. The knitted wire can be a full metal mesh gasket as well as a knitted wire over elastomer gasket.



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All metal mesh gaskets

Material specifications

Monel (MO):
Ø 0,11 mm according to AMS 4730

FCS:
Ø 0,11 mm according to ASTM B520

Stainless steel (VA):
Ø 0,11 mm according to BS EN 10088-3 2005 316 S19

Aluminium (AL):
Ø 0,13 mm according to BS EN 537 pt3

Shielding properties (dB)

H-field

MHz	0,01	0,1	1,0	10,0
MO	28	45	64	> 104
FCS	47	67	88	> 104
VA	35	43	50	---
AL	36	47	64	> 104

E-field

MHz	0,01	0,1	1,0	10,0
MO	> 118	> 136	> 123	99
FCS	> 118	> 136	> 126	109
VA	119	102	---	---
AL	> 118	> 136	> 120	91

P-field

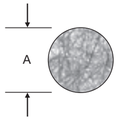
MHz	400	1.000	10.000
MO	96	84	46
FCS	98	77	43
VA	85	62	36
AL	86	72	34

Tolerances

Basic size	Tolerance
Round and rectangular parts	+/– 0,8
Fin	+/– 1,5

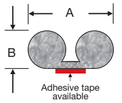
Dimensions in mm (unless otherwise stated).

All metal mesh gaskets



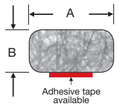
Round cords

Dim. A	Item number
1,6–12,7	WRS-A



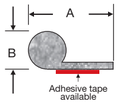
Double round cords with fin

Dim. A	Dim. B	Item number
12,7–25,4	3,2–6,4	WDS-AxB



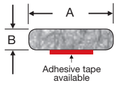
Rectangular profiles

Dim. A	Dim. B	Item number
1,6–9,5	1,6–9,5	WRE-AxB



Round cords with fin

Dim. A	Dim. B	Item number
9,5–25,4	3,2–12,7	WRF-AxB



Knitted flat bands

Dim. A	Dim. B	Item number
6,4–31,1	0,5	WFB-Ax0,5

- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

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Knitted wire over elastomer

Material specifications wire

Monel (MO):
Ø 0,11 mm according to AMS 4730

FCS:
Ø 0,11 mm according to ASTM B520

Stainless steel (VA):
Ø 0,11 mm according to BS EN 10088-3 2005 316 S19

Aluminium (AL):
Ø 0,13 mm according to BS EN 537 pt3

Material specifications elastomer

Solid silicone (SF):
according to ZZ-R-765
Temperature range –40°C to 200°C

Foamed silicone (SG):
accordint to AMS 3195
Temperature range –40°C to 200°C

Foamed neoprene (NE):
according to ASTM D 1056(84)SCE42
Temperature range –15°C to 80°C

Foamed EPDM (EP):
Temperature range –40°C to 100°C

Please note: All sizes listed are that of the elastomer core. Allowances must be made for the wire mesh:

- 1 layer: app. + 0,4 mm
- 2 layers: app. + 0,8 mm

Shielding properties (dB)

H-field

MHz	0,01	0,1	1,0	10,0
MO	28	45	64	> 104
FCS	47	67	88	> 104
VA	35	43	50	---
AL	36	47	64	> 104

E-field

MHz	0,01	0,1	1,0	10,0
MO	> 118	> 136	> 123	99
FCS	> 118	> 136	> 126	109
VA	119	102	---	---
AL	> 118	> 136	> 120	91

P-field

MHz	400	1.000	10.000
MO	96	84	46
FCS	98	77	43
VA	85	62	36
AL	86	72	34

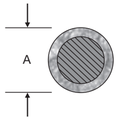
Tolerances

Basic size	Tolerance
Wire mesh	+/– 0,8
Elastomer core < 2	+/– 0,5
Elastomer core 2–10	+/– 0,8
Elastomer core > 10	+/– 1,5

- Other dimensions on request
- Detailed information on our website www.mtc.de/en

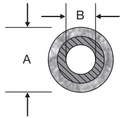
Dimensions in mm (unless otherwise stated).

Knitted wire over elastomer



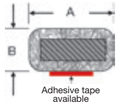
Round profiles

Dim. A	Item number
1,6–12,7	WERS-A



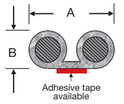
Tubular round profiles

Dim. A	Dim. B	Item number
2,4–12,7	1,0–7,0	WERH-AxB



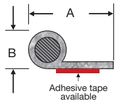
Rectangular profiles

Dim. A	Dim. B	Item number
3,2–12,7	3,2–12,7	WERE-AxB



Double round cords with fin

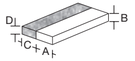
Dim. A	Dim. B	Item number
12,7–25,4	3,2–6,4	WEDS-AxB



Round cords with fin

Dim. A	Dim. B	Item number
9,5–25,4	3,2–12,7	WERF-AxB

Combi gasket



Dim. A	Dim. B	Dim. C	Dim. D	Item number
9,5–15,9	2,4–4,8	2,4–6,4	2,4–6,4	DOXX-AxB-CxD

Material specifications for wire and elastomer on page 34

Dimensions in mm (unless otherwise stated).

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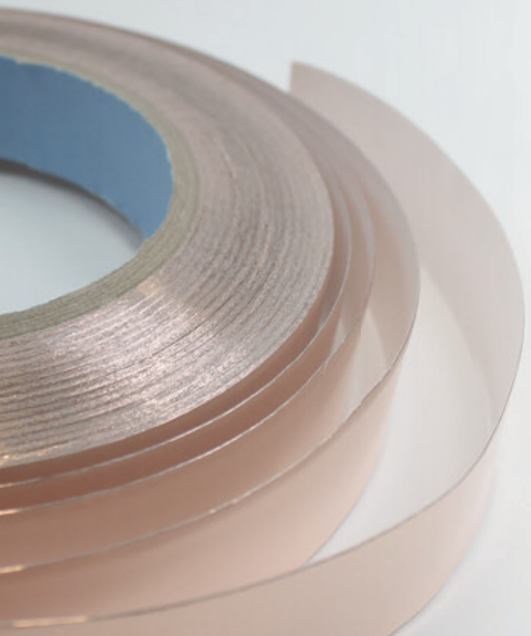

Conductive Tapes

Conductive tapes are supplied with **conductive adhesive** and a **protective cover** as standard. They are available in a range of designs. Customers can choose from the following materials:

- copper
- tin-plated copper
- aluminium
- metallized fabric
- metallized fleece

Depending on customer requirements, the tapes can be manufactured in **a wide range of widths and lengths**. **Stampings** are also possible to order.

Tin-plated copper and fleece tapes can be supplied with **mask**. The mask acts as a protective cover for the conductive surface for **powder coating applications**. After coating, the mask is removed again and there is a conductive connection to the base sheet. The sheet is also protected against corrosion.

Copper tapes and tin-plated copper tapes **can be soldered**.

Conductive tapes provide the following advantages:

- With electrically conductive adhesive as standard
- Punched parts available according to customer's drawings
- Cut to length/punched on roll
- Tin-plated copper- and fleece tapes also available with mask

Copper tapes

Material specifications

Base material	rolled copper foil
Thickness (µm)	approx. 40
Thickness incl. adhesive (µm)	approx. 65
Adhesive tape	electrically conductive
Adhesive strength (N/25mm)	9
Surface resistivity (Ω/□)	max. 0,5
Volume resistivity (Ω/□)	max. 0,1
Temperature stability (°C)	max. 80

Width W	Roll length (m)	Item number
6,0–300,0	33,0	RCU-W

Tin-plated copper tapes

Material specifications

Base material	tin-plated copper foil
Thickness (µm)	approx. 35
Thickness incl. adhesive (µm)	approx. 65
Adhesive tape	electrically conductive
Adhesive strength (N/cm)	4,5
Tensile strength (N/cm)	max. 40
Elongation (%)	max. 5
Temperature stability (°C)	max. 155

Width W	Roll length (m)	Item number
6,0–50,0	33,0	RSC-WxR33

- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

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Aluminium tapes

Material specifications

Base material	aluminium foil
Thickness (µm)	approx. 40
Thickness incl. adhesive (µm)	approx. 62
Adhesive tape	electrically conductive
Adhesive strength (N/25mm)	9
Surface resistivity (Ω/☐)	max. 0,5
Volume resistivity (Ω/☐)	max. 0,1
Temperature stability (°C)	max. 80

Width W	Roll length (m)	Item number
6,0–500,0	50,0	RAL-W

Fabric tapes

Material specifications

Base material	conductive fabric
Thickness (µm)	approx. 100
Thickness incl. adhesive (µm)	approx. 115
Adhesive tape	electrically conductive
Adhesive strength (N/25mm)	10
Surface resistivity (Ω/☐)	max. 0,5
Volume resistivity (Ω/☐)	max. 0,1
Temperature stability (°C)	max. 80

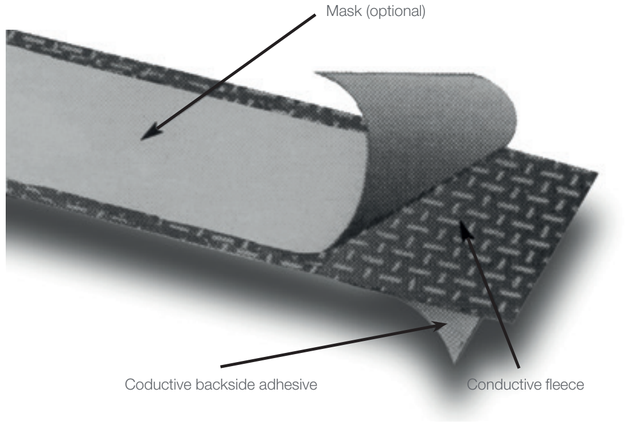
Width W	Roll length (m)	Item number
6,0–500,0	33,0	RGW-NI-W

www

- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

Fleece tapes



Width W	Roll length (m)	Mask M	Adhesive	Item number
8,0–50,0	33,0	without mask	conductive	RUF-WxR33-C-MO
6,0–20,0	33,0	4,0–16,0	conductive	RUF-WxR33-C-M

Conductive fleece tapes provide the following advantages:

- Flexible, high tension fleece material
- High corrosion protection
- Mask serves as protective cover of the conductive surface

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- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

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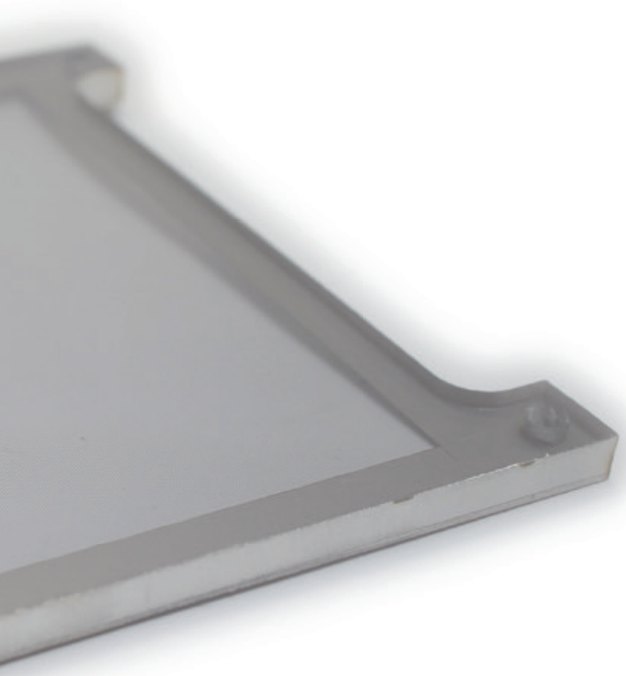

Shielded Windows

Shielded windows are mainly used in front of visual indicating instruments such as displays (LCD, LED, plasma), monitors or information systems.
Generally they guide light through a window and reduce high-frequency electromagnetic radiation at the same time.
As EMC windows are always **manufactured according to customer specifications**, the following procedure is recommended:

1. Selection of the base material (glass or plastic)
2. Selection of the colour of the window (transparent, green, red, blue etc.)
3. Dimensions of the window
4. Construction of the window (butt edge or step construction)
5. Definition of the requested shielding attenuation
6. Antireflection coating (multi-layer coating or chemical etching)
7. Selection of the gasket to be used for connecting the window and the chassis

	Laminated window	Die-casted window	Laminated glass	Laminated plastic
Shielding effectiveness	++	+	+	+
Transmission	+	+	++	++
Scratch resistance	++	– –	++	–
Break resistance	–	++	–	++
Variations of antireflection	++	+	++	++
Weight	–	++	–	++
Methods of contacting	++	+	–	–

++ = very good + = good – – = very bad – = bad

Fully laminated mesh wire

Two substrates and an **electrically conductive metal mesh** are laminated together. The mesh overlaps the edge and can be connected directly to the chassis. It also can be done in combination with an electrically conductive gasket.

Base material:
- glass (float-, heat treated- and chemical toughened glass)
- acrylic glass
- polycarbonate glass

The following combinations are possible:
- glass/mesh/glass
- plastic/mesh/plastic

Before laminating the mesh, the orientation of the mesh should be determined. In some applications a lamination at 90° can cause interferences with the display (so called Moire effect).

Variety of meshes

Blackened mesh	opi	Wire-Ø
Copper	100	0,05
VA	50	0,025
VA (silver plated and blackened)	100	0,025

Shielding properties (dB)

	0,01 MHz	0,1 MHz	1,0 MHz	100 KHz	1,0 MHz	10 MHz	100 MHz	400 MHz	1,0 GHz	10 GHz
	H-field	H-field	H-field	E-field	E-field	E-field	E-field	E-field	P-field	P-field
Option 1	3	7	21	98	93	78	65	60	50	—— *
Option 2	—— *	—— *	—— *	123	152	124	111	115	94	67

* We have not tested double mesh windows at this frequency.

Option 1 refers to a single layer of mesh 100 opi blackened copper, 0,05 mm wire diameter.
Option 2 refers to two layers of mesh 100 opi blackened copper, 0,05 mm wire diameter.

Test methods and procedures in accordance to MIL-Std 285.
Test results base on a RFI shielded window size 1000 x 1000 mm.

ITO coated windows

ITO (Indium Tin Oxide) coatings can be applied on glass as well as on plastic.

With **plastic** ITO is applied under vacuum at lower temperature. Surface conductivities up to 10 Ω/☐ can be reached.
With **glass** a higher temperature can be used and therefore surface resistance can be reduced to < 2,5 Ω/☐.

Main applications are:
- EMI/RFI shielding
- ESD protection
- heated optical filters for displays
- active components for touch-screens

Due to an additional **„index match coating“**, a transmission up to 99 % can be achieved.

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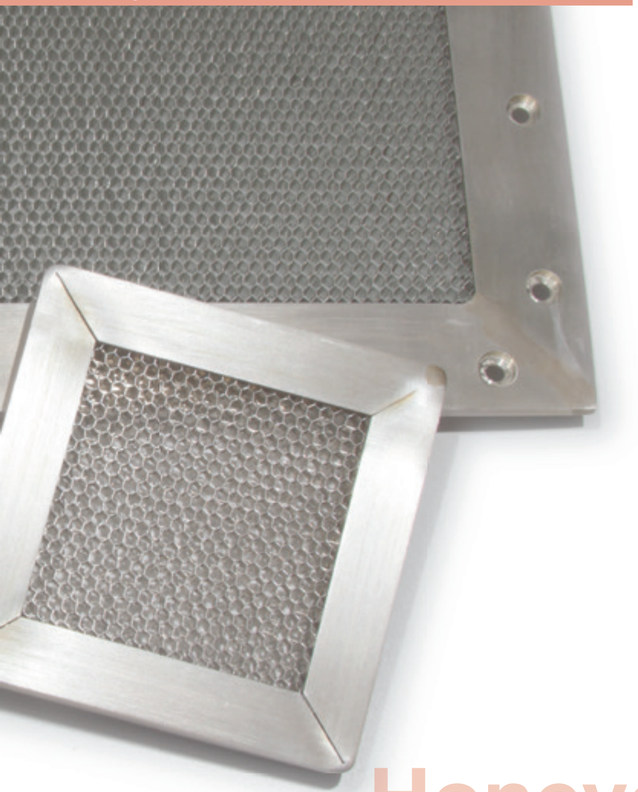


ISO 9001 14001 | RoHS ✓ | REACH ✓

Honeycomb vent panels are designed for use in **electronic enclosures** where good air flow for cooling purposes in addition with an EMI protection is required.

They can be supplied with a **variety of surfaces** to provide corrosion protection or improve conductivity.

There is no standard at honeycomb vent panels. Customers can choose from different **frame types and mounting methods** to suit their EMI/RFI shielding performance requirements.

Standard perforated honeycomb is available with 30°, 45°, 60° and 90° angles. Removable dust- and insect filters can be integrated.

Shielding properties (dB)

	200 KHz	100 MHz	500 MHz	2 GHz	10 GHz
	H-field	E-field	P-field	P-field	P-field
Single honeycomb (3,2 x 6,35 mm)	39	80	55	52	61
Double honeycomb (2 x 3,2 x 3,2 mm)	66	105	81	85	85
Double honeycomb (2 x 3,2 x 6,35 mm)	71	105	93	94	82
Single honeycomb (1,6 x 6,35 mm)	65	105	50	60	72

Vent panel material
Aluminium 5052
Thickness of the foil: 0,04 mm

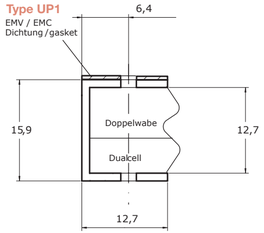
Thickness of honeycomb sheets
3,20 mm
6,35 mm
12,70 mm

Diameter of the cell
1,60 mm
3,20 mm

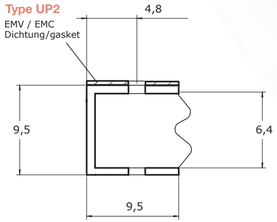
U-shape vent panel

Frame material: Aluminium 6063-T6

Type UP1



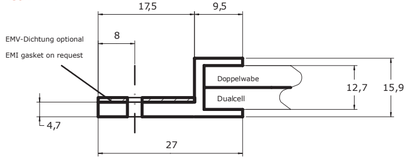
Type UP2



Flange profil

Frame material: Aluminium 6063-T6

Type FP1



- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

Honeycomb Vent Panels

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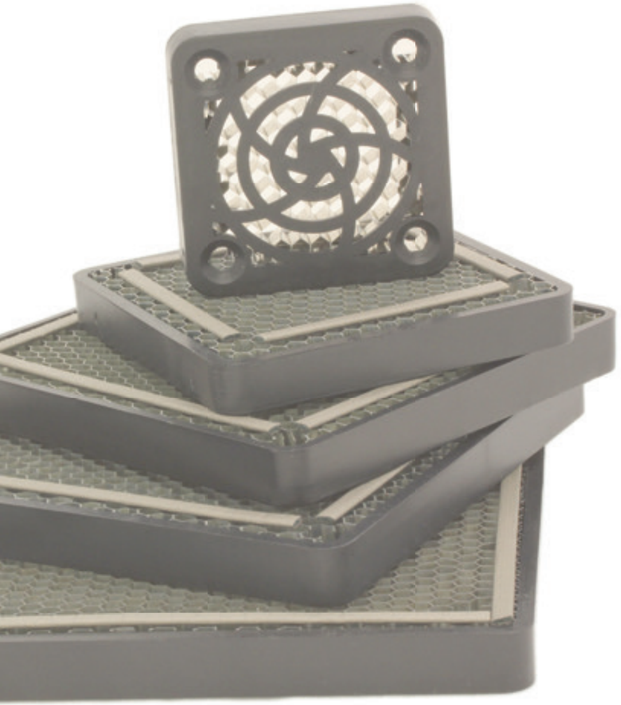
Honeycomb Vent Panels/Fan Vents



ISO 9001 14001 | RoHS ✓ | REACH ✓ | UL 94

Fan vents are a cost-effective alternative to honeycomb vent panels. They are available in five different types by default. Fan vents are suitable for applications that require the usual shielding properties of honeycomb vent panels, but are a much cheaper solution.
One layer of aluminium is pressed into a shock-resistant plastic frame. Standard **fan vents** are available in a material thickness of 6,35 mm and a honeycomb diameter of 3,2 mm.
An **electrically conductive fabric over foam gasket** is usually installed on the edge of the honeycomb material, which guarantees an optimal contact to the housing of the fan.
Fan vents have **four countersunk holes** for easy mounting to the standard fan.

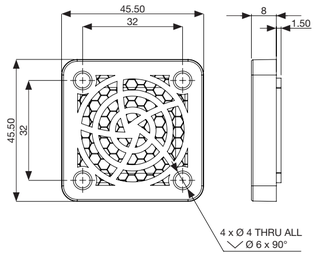
Shielding properties (dB)*

	200 KHz	100 MHz	500 MHz	2 GHz	10 GHz
	H-field	E-field	P-field	P-field	P-field
Single honeycomb (3,2 x 6,35 mm)	53	102	85	74	58

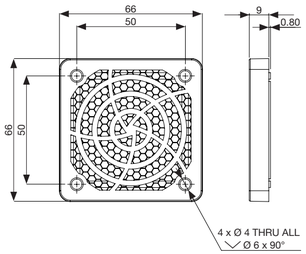
* tested for type LF80

Fan Vents

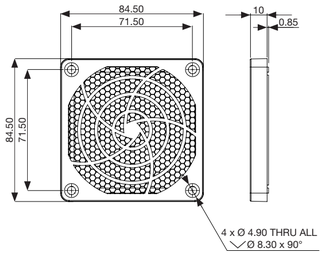
Type LF 40



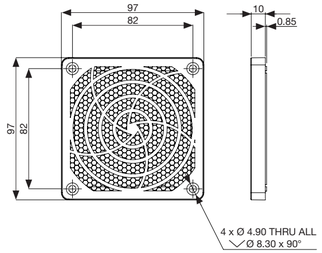
Type LF 60



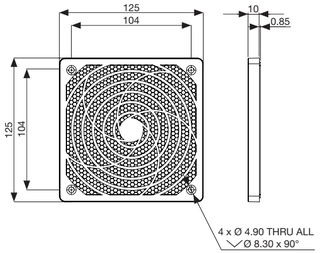
Type LF 80



Type LF 92



Type LF 120



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- Other dimensions on request
- Detailed information on our website www.mtc.de/en

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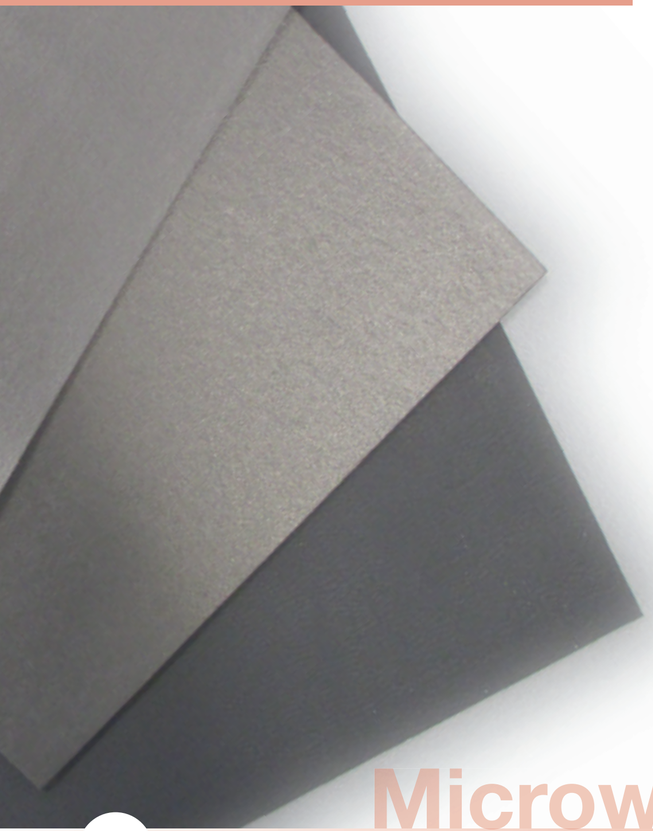
Microwave Absorbers



Microwave Absorbers

Microwave absorbers are mainly used in applications where **high frequencies** should be absorbed. In many cases the “reflective shielding” of EMC gaskets is not fully sufficient.
Microwave absorbers are used in combination with an EMC gasket to reach higher attenuation values. Another application is the **absorption of resonances** in cavities.

Tuned Frequency Absorbers

- Thin, magnetically loaded sheet stock
- Great reflection loss at a discrete frequency (typically 20 dB of attenuation)
- Narrowband absorption at +/-10% of the resonant frequency
- Ideal for the absorption of a single discrete frequency
- Adjustment of the formulation to tune to any frequency from 1 to 40 GHz

Reticulated Foam Absorbers

- Lightweight conductive carbon loaded sheet stock
- Broadband absorption at microwave frequencies
- High reflection when applied to metal surfaces inside microwave cavities, housings, network enclosures or antennae
- Attenuation at normal and high angles of incidence at frequencies from 1 to 18 GHz

Lossy Foam Absorbers

- Lightweight conductive carbon loaded sheet stock
- Broadband absorption at microwave frequencies
- High insertion loss when applied to metal surfaces inside microwave cavities, housings, network enclosures or antennae
- Attenuation at frequencies from 1 to 18 GHz

Cavity Resonance Absorbers

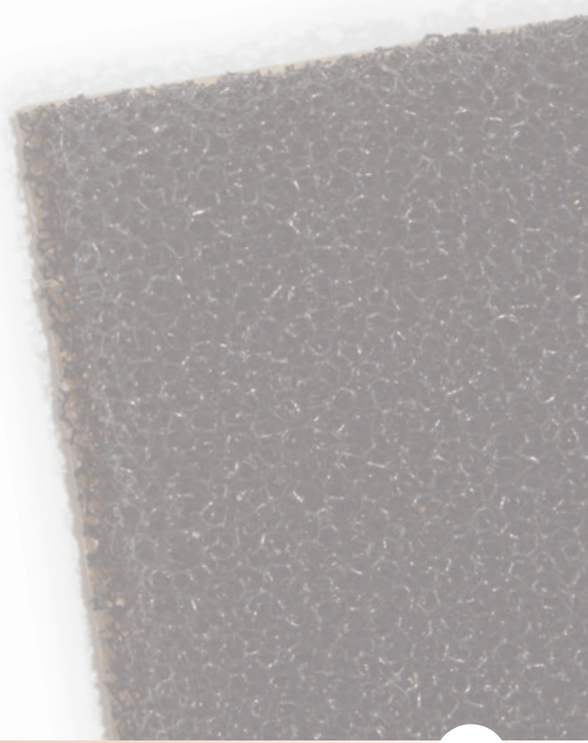
- Thin magnetically loaded sheet stock
- High loss at microwave frequencies
- Application on metal surfaces inside microwave cavities to reduce the Q of the cavity
- Attenuation at normal and high angles of incidence at frequencies from 1 to 20 GHz

Convoluted Foam Absorbers

- Lightweight conductive carbon impregnated sheet stock
- Broadband reflection loss at microwave frequencies
- High reflection loss when applied to metal surfaces inside test boxes, housings, network, enclosures or antennae
- Attenuation at normal and high angles of incidence at frequencies from 1 to 100 GHz

Low Frequency Absorbers

- Magnetically loaded sheet stock
- High attenuation at sub-microwave frequencies
- High permeability at frequencies from 500 MHz to 4 GHz



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Tuned Frequency Absorber

Material specifications

Width x length	610 x 610
Elastomer	silicone
Thickness adhesive	0,12
Hardness (Shore A)	60–80
Operating temperature (°C)	–51 to 190
Flamability (UL94)	V0
Colour	dark grey

Frequency (GHz)	Thickness (A)	Item number
1–35	0,89–3,43	MWA-TFA-610x610xA

Reticulated Foam Absorber

Material specifications

Width x length	610 x 610
Thickness adhesive	0,12
Operating temperature (°C)	–50 to 120
Colour	black

Frequency (GHz)	Thickness (A)	Item number
4–40	12,7–31,8	MWA-RFA-610x610xA

- Other dimensions and frequencies on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

Microwave Absorbers

Lossy Foam Absorber

Material specifications

Width x length	610 x 610
Thickness adhesive	0,12
Operating temperature (°C)	–50 to 120
Colour	black

Frequency (GHz)	Thickness (A)	Item number
0,5–40,0	3,2–50,8	MWA-LFA-610x610xA

Cavity Resonance Absorber

Material specifications

Width x length	610 x 610
Elastomer	silicone
Thickness adhesive	0,12
Hardness (Shore A)	60–80
Operating temperature (°C)	–51 to 190
Flamability (UL94)	V0
Colour	dark grey

Frequency (GHz)	Thickness (A)	Item number
1–26	0,25–3,18	MWA-CRA-610x610xA

- Other dimensions and frequencies on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

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Convoluted Foam Absorber

Material specifications

Width x length	610 x 610
Thickness adhesive	0,12
Operating temperature (°C)	–50 to 120
Colour	black

Frequency (GHz)	Thickness (A)	Item number
4 – 100	38,1 – 76,2	MWA-CFA-610x610xA

Low Frequency Absorber

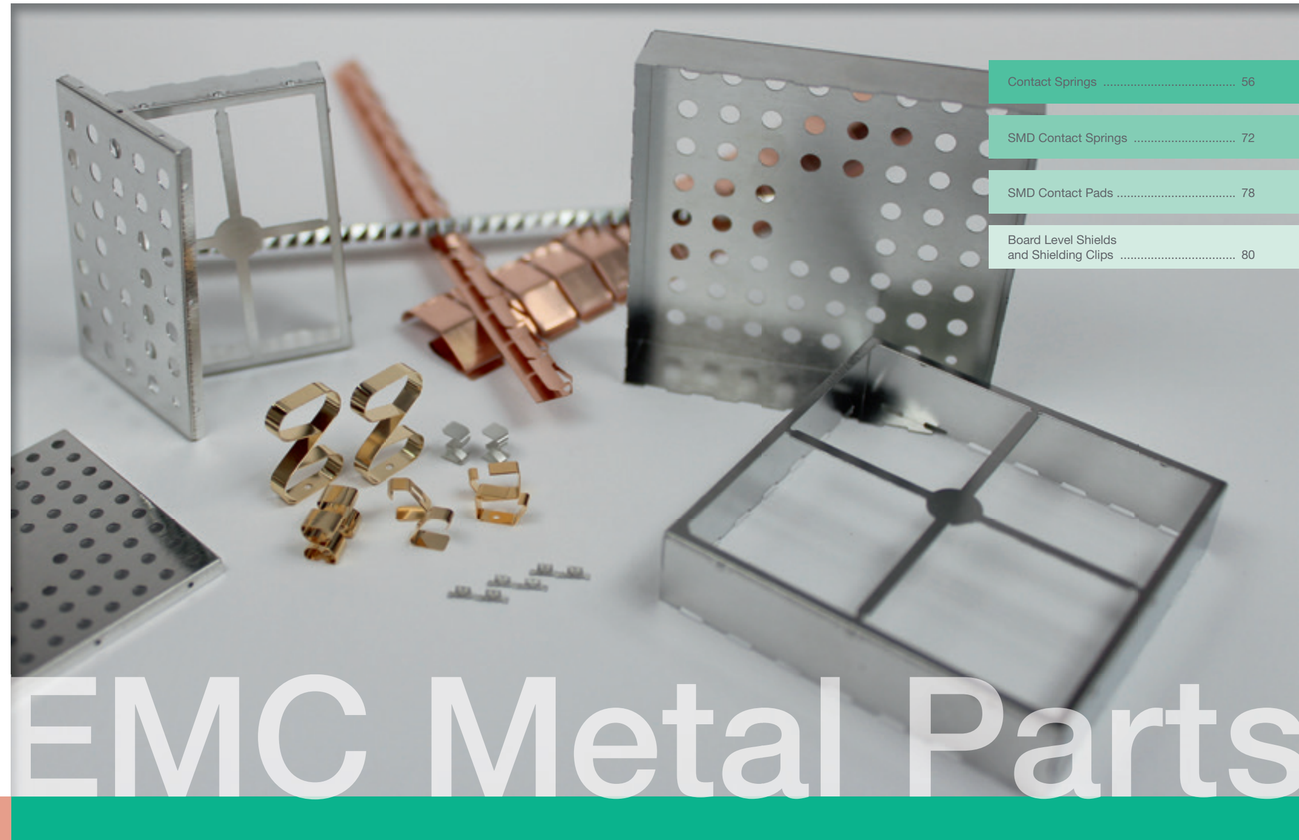
Material specifications

Width x length	610 x 305
Thickness adhesive	0,05
Hardness (Shore A)	60 – 80
Operating temperature (°C)	–50 to 120
Flamability (UL94)	V0
Colour	dark grey

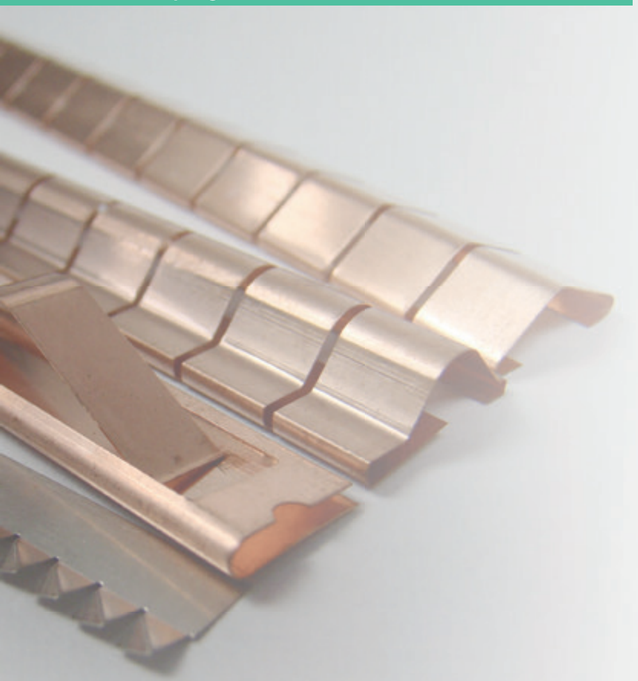
Frequency (GHz)	Thickness (A)	Item number
0,5 – 4,0	0,2 – 1,0	MWA-NFA-610x305xA

- Other dimensions and frequencies on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).



EMC Metal Parts



Contact Springs

Contact springs are used to close gaps between two housing parts. To achieve an optimal shielding effect, the gap must be bridged electrically conductive.

Contact springs are made of **copper-beryllium (CuBe)** or stainless steel. Copper-beryllium is a material that offers **excellent spring characteristics** in combination with a **high material strength**. A further advantage is the high **corrosion resistance**. Copper-beryllium is also resistant against air, ozone, solvent and UV light. It can be used over a **wide temperature range** and shows **excellent thermal and electric conductivity**.

The **wide profile range** in combination with several mounting methods create an universally applicable shielding gasket. The easiest mounting methods are contact springs to **clip-on** and contact springs with a **double sided adhesive tape**.
Soldering or welding ensures the highest possible contact. Generally the **electrochemical reaction** should be considered to avoid galvanic corrosion.

As standard, contact strips are supplied in **bright clean surface (copper)**. On request a surface finish like tin plating, zinc plating, nickel plating, silver plating, gold plating etc. can be applied.

Optionally contact springs can be **cut to length** on customer request. A cut can only be done in the gap between the fingers.
Due to manufacturing tolerances it is recommended to state the number of fingers rather than a given length.

The **standard program** already offers a **huge variety** of contact strips.

Customer-specific contact springs can be realized cost-effectively by ***mtc***.

Surface refinement

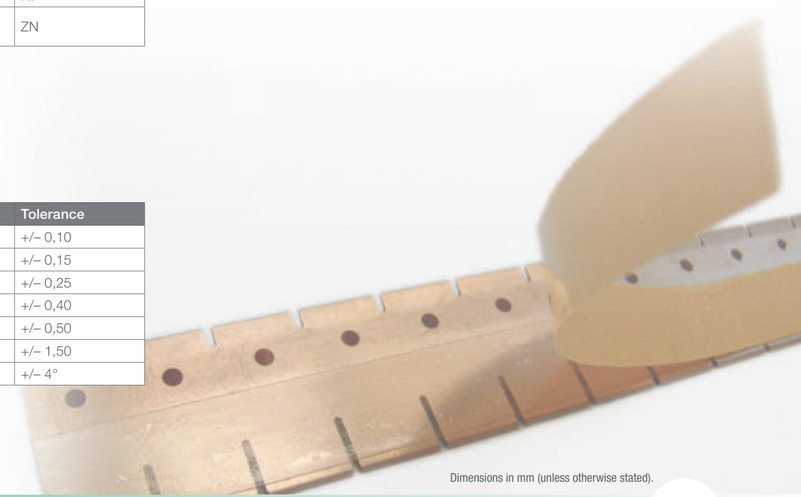
Plating	Material code
blank (without)	BL
gold plated	AU
silver plated	AG
tin matt	SN
nickel matt	NI
clear chromate zinc plating	ZN

Tolerances

Dimensions	Tolerance
< 8	+/– 0,10
8–25	+/– 0,15
25–80	+/– 0,25
80–250	+/– 0,40
250–800	+/– 0,50
> 800	+/– 1,50
angle	+/– 4°

Contact springs provide the following advantages:

- Different surfaces available
- Custom length available
- Different mounting methods available



Dimensions in mm (unless otherwise stated).

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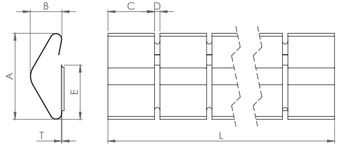
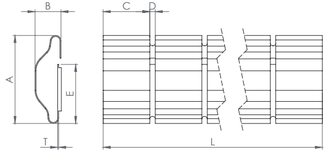
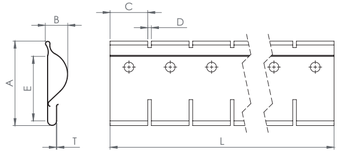
Stick-on Contact springs with adhesive tape



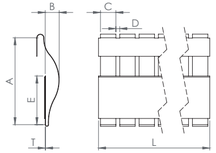
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
7,9	2,9	4,3	0,5	5,0	0,05	406	FCB-301
9,4	3,3	5,7	0,6	5,3	0,05	406	FCB-302
15,2	5,7	8,7	0,8	6,4	0,08	608	FCB-303
19,8	8,2	8,7	0,8	10,1	0,10	455	FCB-304
27,9	10,7	11,7	1,0	17,0	0,10	455	FCB-305
25,9	10,1	11,7	1,0	19,1	0,08	420	FCB-371



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
8,1	2,3	4,3	0,5	5,5	0,09	406	FCB-311
9,4	3,2	5,7	0,6	5,0	0,09	406	FCB-312
15,2	5,5	3,9	0,8	7,0	0,09	455	FCB-313
14,8	5,9	8,7	0,8	7,4	0,09	457	FCB-314



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
13,0	3,5	5,8	0,6	9,9	0,08	406	FCB-431
21,1	6,0	8,5	1,0	17,2	0,10	408	FCB-441

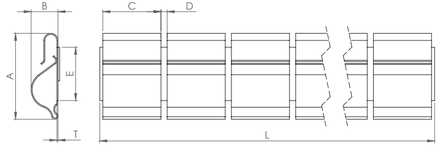


Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
15,2	2,3	2,5	0,6	8,0	0,06	407	FCB-362
11,4	2,0	2,5	0,6	5,8	0,06	406	FCB-822

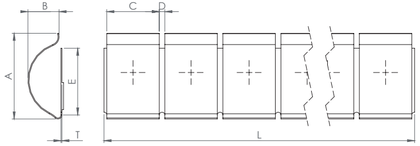
Dimensions in mm (unless otherwise stated).

Contact Springs

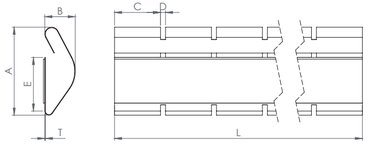
Stick-on Contact springs with adhesive tape



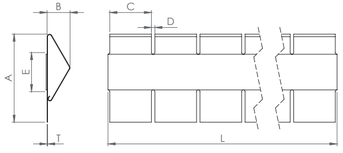
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
6,4	2,0	4,3	0,5	4,0	0,08	406	FCB-411
13,0	3,8	5,8	0,6	7,5	0,08	406	FCB-413
19,3	5,8	8,7	0,8	10,5	0,10	608	FCB-414



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
7,1	2,6	4,3	0,5	5,5	0,08	406	FCB-401
9,0	4,0	5,8	0,6	6,5	0,08	406	FCB-402
14,5	5,6	8,7	0,8	10,0	0,09	609	FCB-403
19,3	6,4	8,5	1,0	10,0	0,10	608	FCB-404
29,7	12,3	11,7	1,0	17,0	0,18	304	FCB-405
15,2	5,8	8,7	0,8	12,7	0,10	409	FCB-423
17,0	7,9	8,5	1,0	13,5	0,10	610	FCB-777



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
8,1	2,8	4,2	0,5	4,9	0,05	409	FCB-341
15,2	5,6	8,7	0,8	7,1	0,08	608	FCB-342



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
12,7	3,3	6,0	0,5	5,6	0,08	403	FCB-381

Dimensions in mm (unless otherwise stated).

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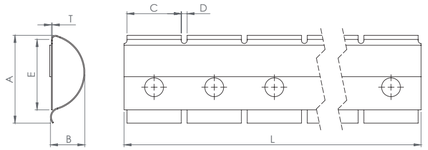
Stick-on Contact springs with adhesive tape

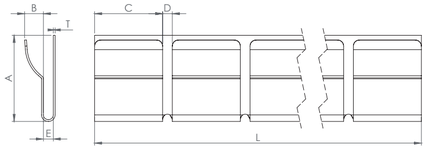


Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
7,1	2,7	4,3	0,5	5,5	0,08	406	FCB-421
9,4	3,6	5,8	0,6	6,7	0,08	406	FCB-422
9,4	3,6	5,8	0,6	7,2	0,08	406	FCB-857

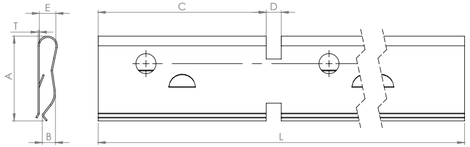
- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

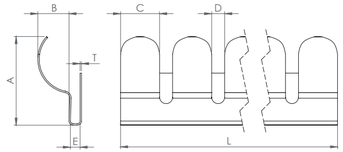
Clip-on Contact springs to clip on



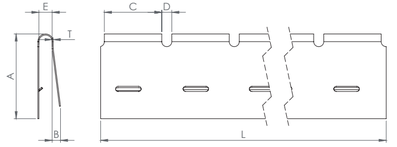
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
7,1	1,5	5,6	0,8	0,8	0,15	404	FCB-101



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
6,4	1,0	12,7	1,1	1,2	0,10	414	FCB-161



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
8,0	2,9	3,6	1,2	0,8	0,13	407	FCB-111
8,0	2,9	3,6	1,2	1,0	0,13	407	FCB-112
8,0	2,9	3,6	1,2	1,5	0,13	407	FCB-113
10,8	3,5	3,6	1,2	0,8	0,13	407	FCB-121
10,8	3,5	3,6	1,2	1,0	0,13	407	FCB-122
10,8	3,5	3,6	1,2	1,5	0,13	407	FCB-123
11,4	2,5	3,6	1,2	1,8	0,08	407	FCB-131
14,7	4,2	3,6	1,2	0,8	0,13	407	FCB-151
14,0	4,2	3,6	1,2	1,0	0,13	500	FCB-152
14,1	4,2	3,6	1,2	1,5	0,13	407	FCB-153
7,8	3,3	3,5	1,2	1,6	0,10	406	FCB-176



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
6,4	0,6	4,3	0,8	1,0	0,08	407	FCB-166

Dimensions in mm (unless otherwise stated).

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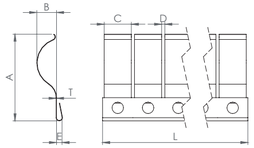
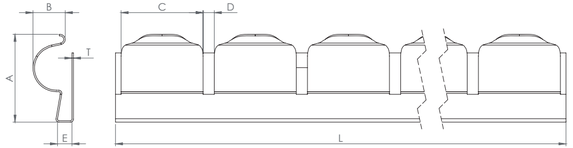
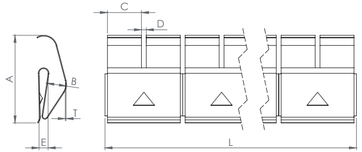
Clip-on Contact springs to clip on



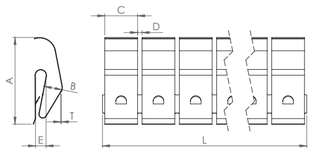
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
27,2	6,2	8,5	1,0	2,0	0,12	406	FCB-818



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
5,9	3,0	5,6	0,8	1,0	0,10	396	FCB-181



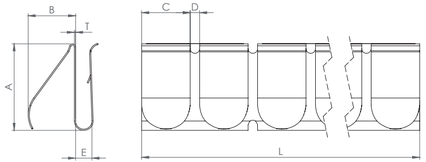
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
14,6	3,6	5,6	0,8	1,0	0,13	409,6	FCB-601-1,0
14,5	3,3	5,6	0,8	1,5	0,13	409,6	FCB-601-1,5
14,2	3,1	5,6	0,8	2,0	0,13	409,6	FCB-601-2,0
13,1	3,6	5,6	0,8	1,0	0,13	409,6	FCB-599-1,0
13,1	3,3	5,6	0,8	1,5	0,13	409,6	FCB-599-1,5
13,1	3,1	5,6	0,8	2,0	0,13	409,6	FCB-599-2,0



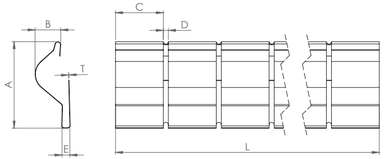
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
14,8	3,1	5,6	0,8	1,8	0,10	380	FCB-600

Dimensions in mm (unless otherwise stated).

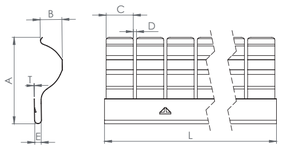
Clip-on Contact springs to clip on



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
9,5	5,2	5,3	1,0	1,8	0,13	406	FCB-201
10,5	6,5	3,2	1,6	2,0	0,13	405	FCB-211
10,5	6,5	8,0	1,6	2,0	0,13	405	FCB-212

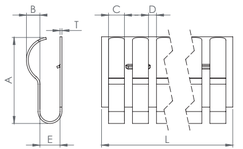


Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
10,2	3,1	5,7	0,6	0,9	0,05	409	FCB-221
10,5	3,0	5,7	0,6	1,5	0,05	409	FCB-222
16,3	5,4	8,7	0,8	1,5	0,09	455	FCB-231



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
27,0	6,8	8,5	1,0	2,0	0,13	494	FCB-241
27,0	6,8	8,5	1,0	2,0	0,13	494	FCB-251*

* with lances



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
6,9	1,1	1,3	0,6	1,6	0,15	406	FCB-171

- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

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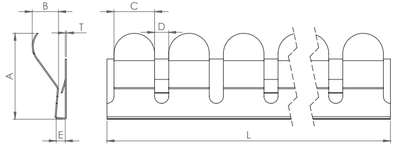
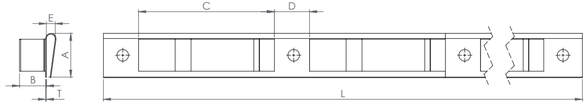
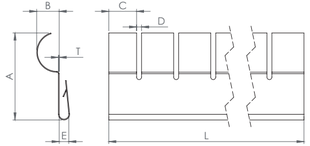
Clip-on Contact springs to clip on



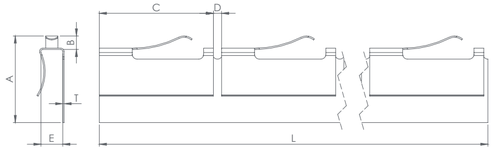
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
7,6	2,9	6,3	1,3	0,8	0,10	427	FCB-186



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
7,5	4,6	23,2	6,0	1,5	0,13	433	FCB-291



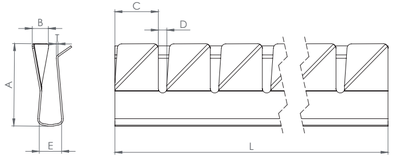
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
11,1	2,9	3,6	0,6	1,2	0,10	32,1	FCB-187



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
5,4	0,8	7,1	0,5	1,4	0,08	404	FCB-296

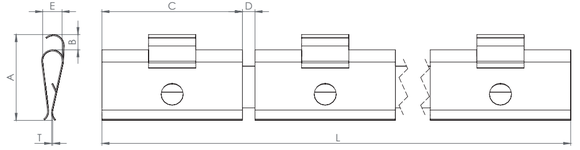
Dimensions in mm (unless otherwise stated).

Clip-on Contact springs to clip on

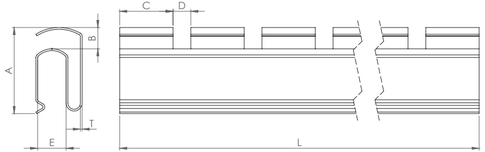


Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
3,8	0,8	2,0	0,4	1,0	0,08	405	FCB-531*
3,8	0,8	2,0	0,4	1,5	0,08	405	FCB-532*
4,1	0,7	2,0	0,4	1,0	0,08	24,1	FCB-533
5,5	0,6	3,4	0,4	1,5	0,08	406	FCB-536

* available with lances



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
7,8	1,4	12,7	1,1	1,8	0,10	415	FCB-602



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
4,9	1,2	3,0	1,0	1,6	0,10	60	FCB-603

Dimensions in mm (unless otherwise stated).

- Other dimensions on request
- Detailed information on our website **www.mtc.de/en**

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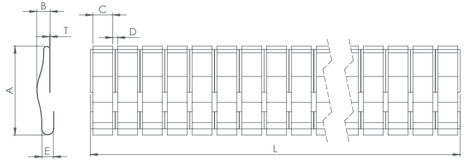
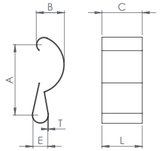
Clip-on

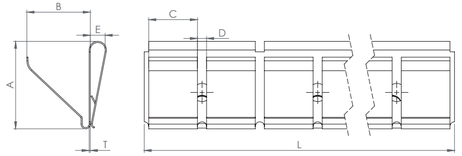
Contact springs to clip on



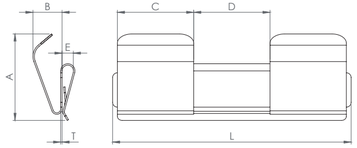
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
11,4	1,7	2,5	0,6	1,5	0,07	406	FCB-821



Dim. A	Dim. B	Dim. C	Dim. E	Dim. T	Dim. L	Item number
9,1	2,7	4,3	1,6	0,08	4,3	FCB-843



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
9,6	7,0	5,4	1,0	1,6	0,13	405	FCB-261

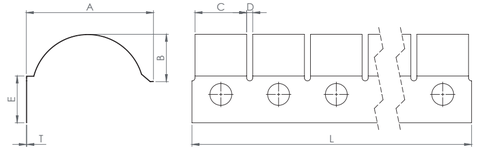


Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
9,1	3,1	8,0	8,0	1,2	0,15	25	FCB-863

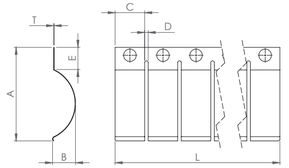
Dimensions in mm (unless otherwise stated).

Special Mounting

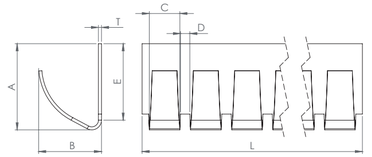
Contact springs to screw, to solder and to clinch



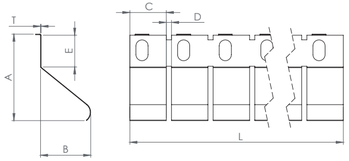
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
14,6	7,8	8,5	1,0	7,7	0,08	409	FCB-811
29,2	10,2	11,7	1,0	19,0	0,13	406	FCB-812
9,4	3,6	5,8	0,6	8,1	0,08	406	FCB-815
18,7	6,7	8,5	1,0	8,7	0,13	406	FCB-816
8,4	2,8	4,3	0,5	5,7	0,08	408	FCB-823
28,7	10,8	11,7	1,0	19,1	0,18	406	FCB-824
9,4	3,5	5,8	0,6	8,1	0,08	406	FCB-847



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
27,0	6,3	8,5	1,0	6,4	0,08	408	FCB-801
41,4	10,4	12,7	1,0	8,0	0,18	405	FCB-802
41,4	10,4	12,7	1,0	9,2	0,18	406	FCB-803
42,3	11,5	11,5	1,0	9,5	0,10	406	FCB-832



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
7,1	5,1	2,5	1,0	6,3	0,25	406	FCB-391



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
24,9	14,5	10,5	1,5	9,2	0,15	406	FCB-835
17,5	6,6	9,0	1,0	10,1	0,10	9	FCB-856

Dimensions in mm (unless otherwise stated).

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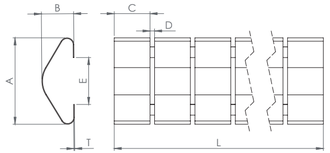
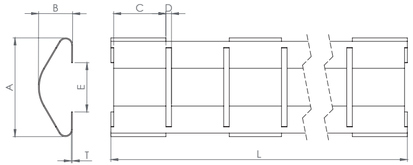
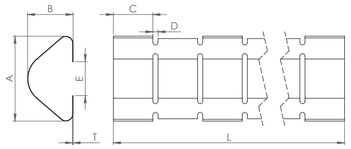
Snap-in Contact springs to slide on (two legs)



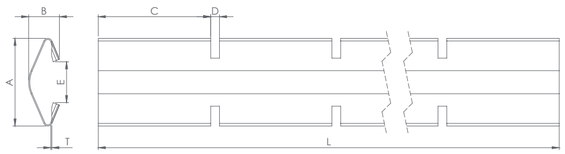
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
20,3	8,1	8,7	---	10,1	0,10	8,7	FCB-721
15,3	5,7	6,3	0,8	8,3	0,08	400	FCB-748
11,0	3,8	5,3	0,7	2,7	0,07	406	FCB-871



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
8,1	2,8	4,3	0,5	4,1	0,08	404	FCB-791
9,4	3,6	4,5	0,7	5,0	0,08	406	FCB-792



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
14,0	7,5	6,5	0,9	5,6	0,08	403	FCB-858

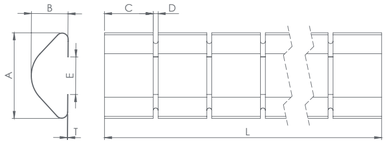


Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
4,7	1,7	6,0	0,5	2,5	0,05	234	FCB-846

Dimensions in mm (unless otherwise stated).

Contact Springs

Snap-in Contact springs to slide on (two legs)



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
7,6	3,3	4,3	0,4	3,3	0,05	333	FCB-732
8,1	2,8	4,3	0,5	3,8	0,08	402	FCB-736
9,4	3,3	5,7	0,6	5,1	0,08	406	FCB-739
7,9	3,1	5,9	0,5	2,3	0,08	406	FCB-761
8,9	2,8	4,3	0,5	2,1	0,08	406	FCB-762
8,9	3,2	4,3	0,5	2,8	0,08	406	FCB-763
8,3	2,6	4,3	0,5	3,9	0,05	408	FCB-771
5,0	2,0	2,7	0,5	1,6	0,08	363	FCB-781

Dimensions in mm (unless otherwise stated).

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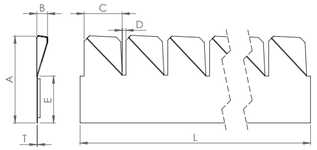
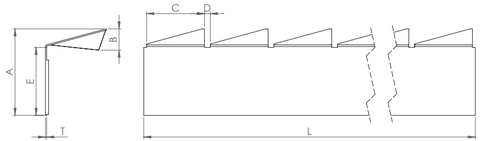
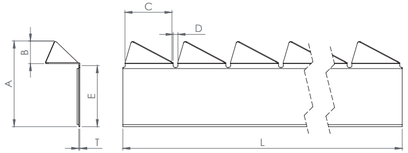
Twisted contact



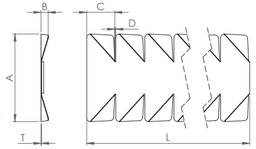
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
8,7	1,0	3,8	0,4	4,7	0,08	406	FCB-504
5,9	0,8	2,4	0,4	3,6	0,08	610	FCB-571



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
5,7	1,4	3,8	0,4	4,5	0,08	504	FCB-505
4,1	0,8	2,0	0,4	3,6	0,08	501	FCB-524



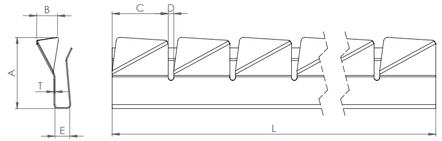
Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
6,8	1,8	3,5	0,4	2,8	0,08	406	FCB-506



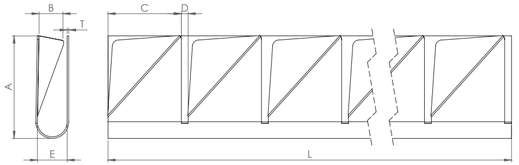
Dim. A	Dim. B	Dim. C	Dim. D	Dim. T	Dim. L	Item number
12,7	1,8	3,8	0,4	0,08	406	FCB-510

Dimensions in mm (unless otherwise stated).

Twisted contact



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
4,8	1,4	3,8	0,4	1,0	0,08	407	FCB-511
4,6	1,5	3,8	0,4	1,5	0,08	407	FCB-512
4,8	1,8	3,8	0,4	2,0	0,08	407	FCB-513
6,4	1,8	3,8	0,4	1,0	0,08	407	FCB-514
6,4	1,8	3,8	0,4	1,5	0,08	407	FCB-515
6,4	1,8	3,8	0,4	2,0	0,08	407	FCB-516



Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. T	Dim. L	Item number
5,3	1,3	3,8	0,4	1,5	0,08	403	FCB-581
3,8	1,0	2,0	0,4	1,2	0,05	192	FCB-582

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Dimensions in mm (unless otherwise stated).

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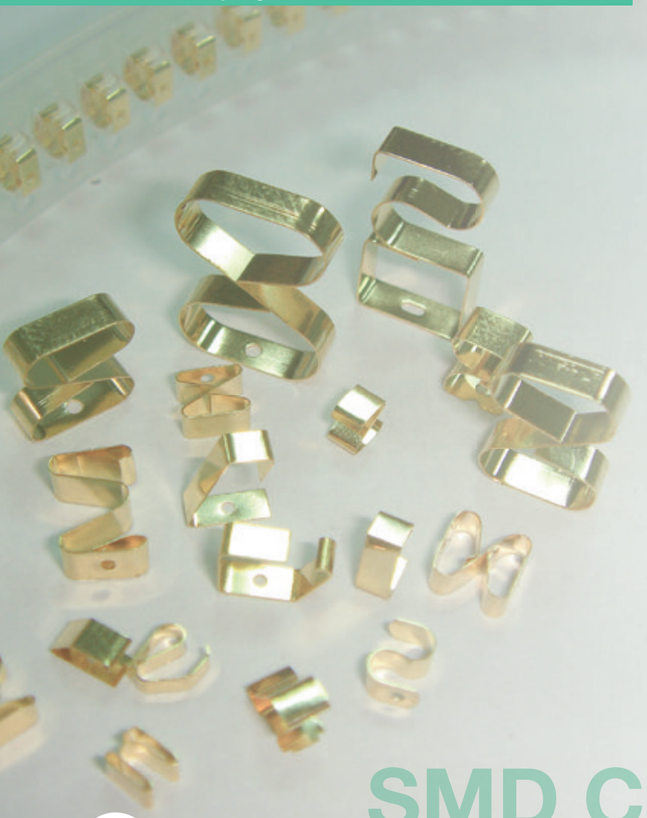


SMD Contact Springs

SMD contact springs are ideal for **automatic assembly** on printed circuit boards. They are soldered by the standard-reflow-soldering process.

The standard base material used for SMD contact springs is **copper-beryllium (CuBe)**. However, other materials such as stainless steel, titanium copper or phosphorus bronze can also be supplied.

Copper-beryllium is **easy to work** and **resistant to corrosion and abrasion**. Even high temperatures and temperature fluctuations or high mechanical stresses have only a low influence on its **excellent connection properties**. In addition, CuBe is **extraordinarily elastic** and offers a high endurance strength.

As standard, SMD springs are **gold-plated** since, with the exception of “royal water” (a mixture of hydrochloric acid and nitric acid), acids are not aggressive towards gold and therefore gold provides **excellent corrosion protection**. In addition, the gold-plated surface is ideal for soldering. Of course, other finishes (for example tin or nickel) can be ordered, too.

SMD contact springs are **very resistant** and have an **almost unlimited** working life.

SMD contact springs can be supplied in a very **wide range of dimensions and shapes**. The standard range includes a large number of different spring types in heights from 1,5 to 13 mm. Depending on costumer requirements and the individual installation situation, **customized SMD springs** can be supplied at low tooling costs and part prices.

For reasons of space, the SMD contact springs have been summarized in types. Only a schematic drawing is used for the presentation of an SMD type.

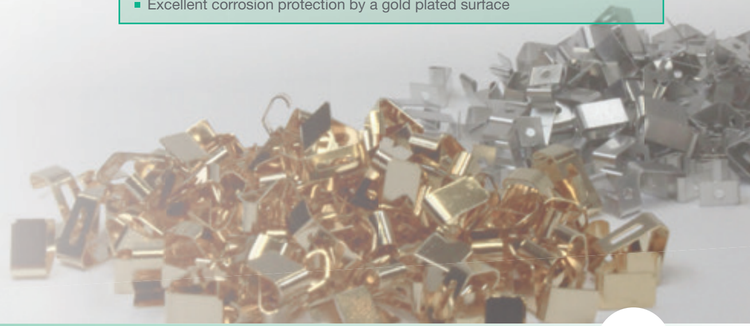
It is necessary to request the technical documentation with the proposal for the pad before you start the design of the printed circuit board. You can also find it on our website.

Surface refinement

Plating	Material code
gold plated (standard)	AU
tin plated	SN

SMD contact springs provide the following advantages:

- Available in different dimensions and types
- Ideal for automatic assembly
- Excellent corrosion protection by a gold plated surface



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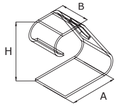
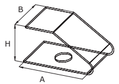
Type 1



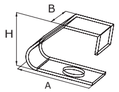
Dim. A	Dim. B	Dim. H	Item number
4,5	2,5	3,5	FCB-01CG2545035B1-XX-SMD
4,5	2,5	3,6	FCB-01CG2545036B-XX-SMD
3,0	2,0	4,0	FCB-01CG2030040B-XX-SMD
4,8	2,5	4,5	FCB-01CG2548045B-XX-SMD
4,5	2,0	4,8	FCB-01CG2045048B-XX-SMD

Type 2



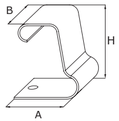
Dim. A	Dim. B	Dim. H	Item number
2,7	1,5	1,5	FCB-02CG1527015B-XX-SMD
3,8	2,0	2,0	FCB-02CG2038020B-XX-SMD

Type 3



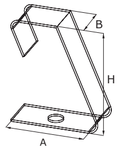
Dim. A	Dim. B	Dim. H	Item number
3,2	1,5	1,5	FCB-03CG1532015B-XX-SMD
3,2	2,0	1,5	FCB-03CG2032015B-XX-SMD
2,7	1,5	2,0	FCB-03CG1527020T-XX-SMD*
4,0	2,0	2,1	FCB-03CG2040021B-XX-SMD
3,2	2,0	3,5	FCB-03CG2032035B-XX-SMD
5,0	2,5	3,6	FCB-03019-XX-SMD
3,0	2,0	4,0	FCB-03025-XX-SMD
4,1	2,5	4,3	FCB-03023-XX-SMD
4,0	2,5	4,0	FCB-03017-XX-SMD
6,2	2,5	4,8	FCB-03CG2562048B-XX-SMD
4,0	2,0	5,5	FCB-03CG2040055B-XX-SMD
7,0	2,5	5,5	FCB-03008-XX-SMD

Type 4



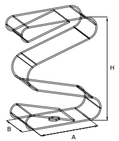
Dim. A	Dim. B	Dim. H	Item number
4,3	2,5	3,5	FCB-04CG2543035B-XX-SMD
4,0	2,5	5,0	FCB-047G2540050B-XX-SMD
4,3	2,5	5,0	FCB-04CG2543050B-XX-SMD
4,0	2,0	5,3	FCB-04CG2040053B-XX-SMD
4,0	2,5	5,4	FCB-044G2540054B-XX-SMD
6,0	2,0	6,0	FCB-04CG2060060B-XX-SMD

Type 5



Dim. A	Dim. B	Dim. H	Item number
3,5	2,0	3,5	FCB-05CG2035035B-XX-SMD
3,0	2,5	4,0	FCB-05CG2530040B-XX-SMD
4,0	2,5	5,0	FCB-05CG2540050B-XX-SMD
4,7	2,0	5,7	FCB-05CG2047057B-XX-SMD

Type 6

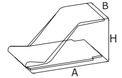


Dim. A	Dim. B	Dim. H	Item number
4,8	2,5	7,0	FCB-063G2548070B-XX-SMD
7,0	2,5	9,0	FCB-063G2570090B-XX-SMD
6,0	3,0	10,0	FCB-063G3060100B-XX-SMD

Dimensions in mm (unless otherwise stated).

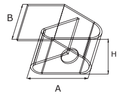
SMD Contact Springs

Type 7



Dim. A	Dim. B	Dim. H	Item number
4,0	2,2	2,2	FCB-07004-XX-SMD
4,0	2,2	2,2	FCB-07CG2240022B-XX-SMD

Type 8

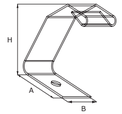


Dim. A	Dim. B	Dim. H	Item number
3,0	2,0	2,5	FCB-085G2030025B-XX-SMD

Type 9

Dim. A	Dim. B	Dim. H	Item number
5,8	2,0	5,0	FCB-09CG2058050B-XX-SMD

Type 10

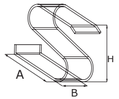


Dim. A	Dim. B	Dim. H	Item number
4,5	2,5	4,8	FCB-10CG2545048B-XX-SMD
4,0	2,5	5,5	FCB-10CG2540055B-XX-SMD
4,0	2,5	6,0	FCB-10CG2540060B-XX-SMD

Type 11

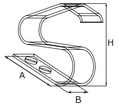
Dim. A	Dim. B	Dim. H	Item number
3,0	2,0	3,1	FCB-11SG2030031B-XX-SMD
3,0	2,0	3,6	FCB-11SG2030036B-XX-SMD

Type 12



Dim. A	Dim. B	Dim. H	Item number
2,7	1,3	2,2	FCB-12ZG1327022B-XX-SMD
2,7	2,0	2,2	FCB-12ZG2027022B-XX-SMD
3,5	1,8	2,5	FCB-12ZG1835025B-XX-SMD

Type 13



Dim. A	Dim. B	Dim. H	Item number
3,7	1,2	3,2	FCB-13ZG1237032B-XX-SMD

Dimensions in mm (unless otherwise stated).

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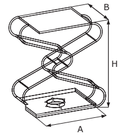
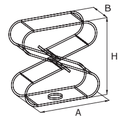
Type 14



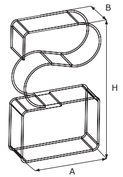
Dim. A	Dim. B	Dim. H	Item number
3,5	2,5	4,0	FCB-14XG2535040B-XX-SMD
8,5	3,5	9,8	FCB-14XG3585098B-XX-SMD

Type 15



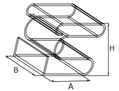
Dim. A	Dim. B	Dim. H	Item number
4,0	2,0	3,7	FCB-158G2040037B-XX-SMD
4,5	2,0	4,5	FCB-158G2045045B-XX-SMD
7,0	2,5	6,2	FCB-158G2570062B-XX-SMD
7,0	2,5	7,5	FCB-158G2570075B-XX-SMD
7,0	2,5	9,0	FCB-158G2570090B-XX-SMD
7,0	2,5	10,0	FCB-158G2570100B-XX-SMD
9,0	2,5	13,0	FCB-158G2590130B-XX-SMD

Type 16



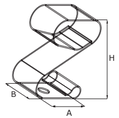
Dim. A	Dim. B	Dim. H	Item number
4,5	2,0	7,0	FCB-16SG2045070B-XX-SMD
6,5	2,5	8,0	FCB-16SG2565080B-XX-SMD
7,0	2,5	12,0	FCB-16SG2570120B-XX-SMD
7,0	2,5	13,0	FCB-16SG2570130B-XX-SMD

Type 17



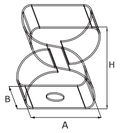
Dim. A	Dim. B	Dim. H	Item number
3,0	2,0	2,5	FCB-173G2030025B-XX-SMD
3,0	2,0	3,0	FCB-173G2030030B-XX-SMD
3,0	2,0	3,5	FCB-173G2030035B-XX-SMD
3,5	2,0	4,2	FCB-173G2035042B-XX-SMD
3,8	2,0	6,2	FCB-173G2038062B-XX-SMD
4,5	2,0	7,0	FCB-173G2045070B-XX-SMD

Type 18



Dim. A	Dim. B	Dim. H	Item number
4,5	2,5	6,0	FCB-185G2545060-XX-SMD

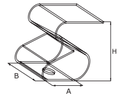
Type 19



Dim. A	Dim. B	Dim. H	Item number
4,0	3,0	5,1	FCB-198G3040051B-XX-SMD

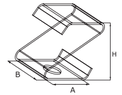
Dimensions in mm (unless otherwise stated).

Type 20



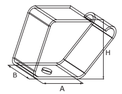
Dim. A	Dim. B	Dim. H	Item number
3,0	2,0	3,1	FCB-205G2030031B-XX-SMD
4,0	2,5	4,1	FCB-205G2540041B-XX-SMD
3,5	2,0	4,2	FCB-205G2035042B-XX-SMD
7,0	2,0	6,2	FCB-205G2070062B-XX-SMD

Type 21



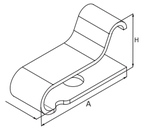
Dim. A	Dim. B	Dim. H	Item number
2,9	2,0	2,8	FCB-21ZG2028028S-XX-SMD
3,5	1,4	3,4	FCB-21ZG1435034S-XX-SMD
3,8	2,5	3,5	FCB-21ZG2538035B-XX-SMD
4,4	2,8	4,0	FCB-21ZG2844040B-XX-SMD
5,0	3,0	4,0	FCB-21ZG3050040B-XX-SMD
5,0	3,0	5,5	FCB-21012-XX-SMD
5,0	3,0	7,0	FCB-21015-XX-SMD
5,0	3,0	7,5	FCB-21016-XX-SMD

Type 22



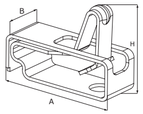
Dim. A	Dim. B	Dim. H	Item number
6,0	2,0	4,0	FCB-22CG2060040B-XX-SMD

Type 23



Dim. A	Dim. B	Dim. H	Item number
2,8	1,0	1,5	FCB-23CG1028015B-XX-SMD

Type 24



Dim. A	Dim. B	Dim. H	Item number
3,20	0,80	1,60	FCB-24YG1632080B-AU-SMD
3,50	1,00	1,80	FCB-24YG1835008B-AU-SMD
2,95	1,00	2,10	FCB-24YG2129008T-AU-SMD
4,80	1,00	2,50	FCB-24YG2548010B-AU-SMD
3,60	1,20	3,20	FCB-24YG3236012T-AU-SMD
3,00	2,00	3,50	FCB-24YG3530010T-AU-SMD

- Customer-specific parts on request
- Samples without tooling costs, serial quantities with low tooling costs
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

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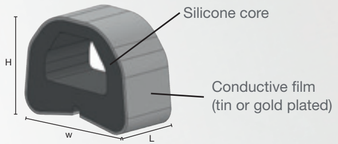
SMD Contact Pads

SMD contact pads are used exclusively on the printed circuit board and, due to their electrical and physical properties, they are an excellent alternative for grounding of PCBs.

SMD contact pads are characterized by the **following features**:
- high abrasion resistance
- excellent spring properties
- plane-parallel compression at all heights
- excellent electrical conductivity
- high heat resistance
- SMT mountable characteristics for automatic soldering procedure

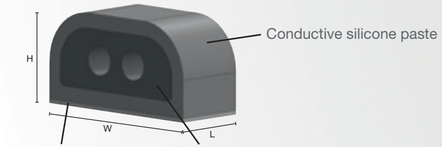
As an alternative to SMD contact springs SMD contact pads are available in **two versions**:
- Type W: silicone rubber coated with conductive film
- Type S: silicone core coated with conductive silicone paste

Type W

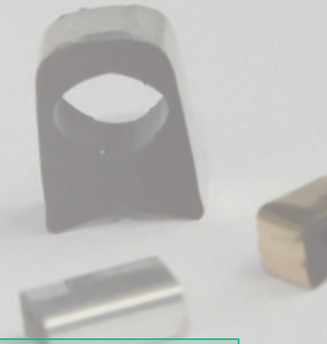


Dim. W	Dim. H	Dim. L	Item number
2,0–10,0	0,7–12,0	1,0–8,4	SMG-W-BxHxL-XX

Type S



Dim. W	Dim. H	Dim. L	Item number
2,0	0,8–2,5	1,0–1,8	SMG-S-BxHxL-SN



Surface refinement

Plating	Material code
gold plated	AU
tin plated	SN

SMD contact pads provide the following advantages:
- High adhesion after SMT procedure
- High temperature resistance
- Excellent spring properties
- Excellent grounding characteristics

- Detailed information on our website **www.mtc.de/en**

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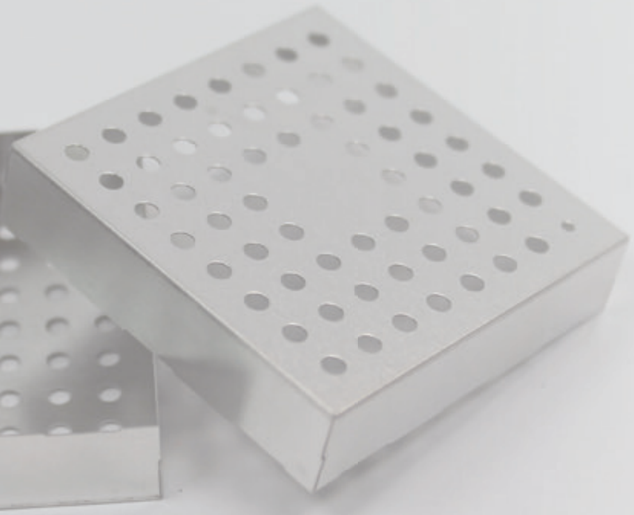


No matter whether they are for prototypes or for mass production, in small or large quantities, ***mtc*** offers a **cost-efficient way** to protect components directly on the printed circuit board.

One-piece board level shields for soldering

One-piece board level shields represent the **most cost-effective version** with a **maximum shielding effect**. The cover is soldered on the printed circuit board in a **fully automated** way.

One-piece board level shields with shielding clips

Shielding clips are **fully automatically placed** on the printed circuit board. The clips are available as standard articles and therefore additional tooling costs can be saved. The assembly of the covers is done manually or automatically. Due to the removable cover, the underlying components are **accessible at any time**.

Two-piece board level shields for soldering

Two-piece board level shields consist of a **solderable frame** and a **removable cover**. In addition to an excellent EMI protection, they offer the advantage that components lying under the cover can be **easily maintained and repaired**. The assembly of the frames is **fully automatic**. The installation of the covers is made manually or automatically.

The basic material of the ***mtc*** board level shields is **SPTE**, the surface is **tin-plated**. In addition to the standard board level shields, **customer-specific parts** can be manufactured on request.

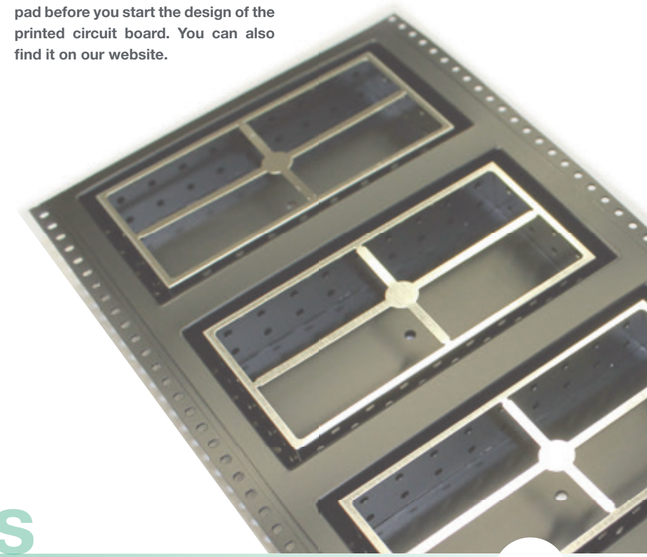
To avoid **heat development** and disorders of the components, it is advisable to provide **air holes** in the shielding cover.

mtc also offers the possibility to integrate a **thermally conductive gap filler** in the shielding cover if a **high heat dissipation** is required.

If a higher shielding effect in the **high-frequency range** is required, it is possible to integrate **microwave absorbers**.

For reasons of space only schematic drawings are used.

Please request the technical documentation with the proposal for the pad before you start the design of the printed circuit board. You can also find it on our website.



Board Level Shields and Shielding Clips

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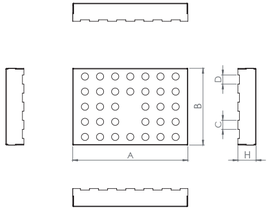
One-piece board level shields for soldering

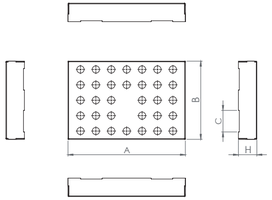


Dimension A	Dimension B	Dimension C	Dimension D	Dimension H	Material thickness	Item number
13,66	12,70	3,00	3,00	2,54	0,20	SGH-13,66x12,70x2,54x0,20-FS-OP
16,50	16,50	3,00	3,00	3,60	0,20	SGH-16,50x16,50x3,60x0,20-FS-OP
26,21	26,21	3,00	3,00	5,08	0,20	SGH-26,21x26,21x5,08x0,20-FS-OP
29,36	18,50	3,00	3,00	7,00	0,20	SGH-29,36x18,50x7,00x0,20-FS-OP
32,00	32,00	3,00	3,00	6,00	0,20	SGH-32,00x32,00x6,00x0,20-FS-OP
36,83	33,68	3,00	3,00	5,08	0,20	SGH-36,83x33,68x5,08x0,20-FS-OP
38,10	25,40	3,00	3,00	6,00	0,20	SGH-38,10x25,40x6,00x0,20-FS-OP
39,60	39,60	3,00	3,00	7,00	0,20	SGH-39,60x39,60x7,00x0,20-FS-OP
44,00	30,50	3,00	3,00	3,00	0,20	SGH-44,00x30,50x3,00x0,20-FS-OP
44,37	44,37	3,00	3,00	9,75	0,20	SGH-44,37x44,37x9,75x0,20-FS-OP

- Customer-specific parts on request
- Samples without tooling costs, serial quantities with low tooling costs
- Get detailed information on our website **www.mtc.de/en**

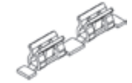
Dimensions in mm (unless otherwise stated).

One-piece board level shields with shielding clips



Dimension A	Dimension B	Dimension C	Dimension H	Material thickness	Item number
13,66	12,70	7,00	2,54	0,20	SGH-13,66x12,70x2,54x0,20-FS-SC
16,50	16,50	7,00	3,60	0,20	SGH-16,50x16,50x3,60x0,20-FS-SC
26,21	26,21	7,00	5,08	0,20	SGH-26,21x26,21x5,08x0,20-FS-SC
29,36	18,50	7,00	7,00	0,20	SGH-29,36x18,50x7,00x0,20-FS-SC
32,00	32,00	7,00	6,00	0,20	SGH-32,00x32,00x6,00x0,20-FS-SC
36,83	33,68	7,00	5,08	0,20	SGH-36,83x33,68x5,08x0,20-FS-SC
38,10	25,40	7,00	6,00	0,20	SGH-38,10x25,40x6,00x0,20-FS-SC
39,60	39,60	7,00	7,00	0,20	SGH-39,60x39,60x7,00x0,20-FS-SC
44,00	30,50	7,00	3,00	0,20	SGH-44,00x30,50x3,00x0,20-FS-SC
44,37	44,37	7,00	9,75	0,20	SGH-44,37x44,37x9,75x0,20-FS-SC

Standard shielding clips



Length	Width	Height	Piece (roll)	Thickness shielding cover	Coating	Material	Item number
6,50	0,80	1,27	10.000	0,15–0,20	SN	Stainless steel	SC-6,50x0,80x1,27-TC-0,15EMB

- Other **shielding clips** on request
- Customer-specific parts on request
- Samples without tooling costs, serial quantities with low tooling costs
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

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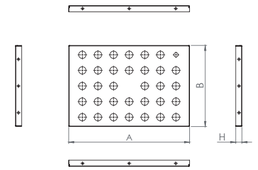
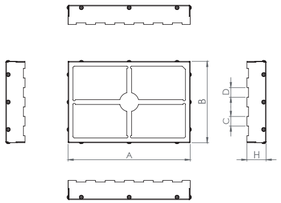
Two-piece board level shields for soldering

Cover



Frame



Type	Dim. A	Dim. B	Dim. C	Dim. D	Dim. H	Material thickness	Item number
Cover	14,26	13,30	---	---	2,00	0,15	SGH-14,26x13,30x2,00x0,15-FS-C
Frame	13,66	12,70	3,00	3,00	2,54	0,20	SGH-13,66x12,70x2,54x0,20-FS-F
Cover	17,10	17,10	---	---	2,00	0,15	SGH-17,10x17,10x2,00x0,15-FS-C
Frame	16,50	16,50	3,00	3,00	3,60	0,20	SGH-16,50x16,50x3,60x0,20-FS-F
Cover	26,67	26,67	---	---	2,00	0,15	SGH-26,67x26,67x2,00x0,15-FS-C
Frame	26,21	26,21	3,00	3,00	5,08	0,20	SGH-26,21x26,21x5,08x0,20-FS-F
Cover	29,96	19,10	---	---	2,00	0,15	SGH-29,96x19,10x2,00x0,15-FS-C
Frame	29,36	18,50	3,00	3,00	7,00	0,20	SGH-29,36x18,50x7,00x0,20-FS-F
Cover	32,60	32,60	---	---	2,00	0,15	SGH-32,60x32,60x2,00x0,15-FS-C
Frame	32,00	32,00	3,00	3,00	6,00	0,20	SGH-32,00x32,00x6,00x0,20-FS-F
Cover	37,43	34,28	---	---	2,00	0,15	SGH-37,43x34,28x2,00x0,15-FS-C
Frame	36,83	33,68	3,00	3,00	5,08	0,20	SGH-36,83x33,68x5,08x0,20-FS-F
Cover	38,70	26,00	---	---	2,00	0,15	SGH-38,70x26,00x2,00x0,15-FS-C
Frame	38,10	25,40	3,00	3,00	6,00	0,20	SGH-38,10x25,40x6,00x0,20-FS-F
Cover	40,20	40,20	---	---	2,00	0,15	SGH-40,20x40,20x2,00x0,15-FS-C
Frame	39,60	39,60	3,00	3,00	7,00	0,20	SGH-39,60x39,60x7,00x0,20-FS-F
Cover	44,60	31,10	---	---	2,00	0,15	SGH-44,60x31,10x2,00x0,15-FS-C
Frame	44,00	30,50	3,00	3,00	3,00	0,20	SGH-44.00x30,50x3,00x0,20-FS-F
Cover	44,97	44,97	---	---	2,00	0,15	SGH-44,97x44,97x2,00x0,15-FS-C
Frame	44,37	44,37	3,00	3,00	9,75	0,20	SGH-44,37x44,37x9,75x0,20-FS-F

- Customer-specific parts on request
- Samples without tooling costs, serial quantities with low tooling costs
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

Thermally Conductive Products

Thermally Conductive Paste

The use of **thermally conductive products** is recommended to improve heat dissipation from the component to the heat sink. By displacing the air with a highly thermally conductive material, heat dissipation is increased and the modul is **better protected from overheating**.

Thermally conductive paste is the most common material used for thermal management. It **compensates unevennesses** between the component surface and the heat sink like all other thermal products do.

The **excellent thermal properties** are the main criterion for choosing thermally conductive paste. The high-quality paste forms a thin binding film, which offers a **very good thermal conductivity** with **low thermal resistance**.

Thermally conductive paste is **material-saving and easy to handle**. Due to the **low viscosity of the material**, it can be applied mechanically and precisely in a silkscreen process or by masking technology.

In contrast to gap fillers, thermally conductive paste is not suitable to bridge larger distances between the heat source and the heat sink. Therefore it is often used for small components, which have to be cooled.

The ***mtc*** product range includes thermally conductive **paste with a thermal conductivity between 2,0 and 6,0 W/m*K** in a dispensable or paste-like quality.

Dispensable

Item number	TCTP-3,5
Thermal conductivity (W/m*K)	3,5
Breakdown voltage (kV)	8
Volume resistivity (Ω*cm)	1.000
Density (g/cm³)	3,3
Operation temperature (°C)	– 40 to 200
Colour	grey
Order quantity (g)	150, 200, 500, 1.000

Paste-like

Item number	TCTG-2,0	TCTG-4,0	TCTG-6,0
Thermal conductivity (W/m*K)	2,0	4,0	6,0
Thermal impedance (K*in²/W)@50psi	0,05	0,025	0,015
Viscosity (kcps)	1.850	2.350	2.150
Density (g/cm³)	2,5	2,5	2,8
Evaporation (%/200°C@24hrs)	0,15	0,18	0,15
Operation temperature (°C)	–40 to 200	–40 to 200	–40 to 200
Colour	white	grey	grey
Order quantity (g)	150, 200, 500, 1.000	150, 200, 500, 1.000	150, 200, 500, 1.000

Thermally conductive paste provides the following advantages:

- Excellent heat dissipation and heat transfer
- Compensation of microscopic unevennesses
- High yield
- Available in dispensable or paste-like quality

- Other specifications on request
- Detailed information on our website **www.mtc.de/en**

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ISO 9001 14001 | RoHS ✓ | REACH ✓ | UL 94

In addition to very good thermal properties, **thermally conductive gap fillers**, also called gap pads, offer the advantage to compensate **larger gaps** between the components (hot spots) and the cooling element. Thereby the thermal resistance is minimized. Gap fillers convince through their **excellent conformability** and completely fill the air gap caused by differences in building height.

Gap fillers are used in many **applications** like
- LEDs,
- audio- and video devices,
- medical instruments,
- notebook computers and
- automotive devices

Thermally conductive gap pads are based on **silicone** and are filled with **ceramic material**. They are sticky by nature. This can be single- or double-sided. The use of an adhesive tape is not necessary in most cases. Gap fillers can be removed **without leaving any residues**.

mtc gap fillers are supplied as die-cut parts or standard sheets in thicknesses from **0,5 to 5,0 mm**.

Tolerances

Thickness	Tolerance
≤ 0,5	+/– 0,05
0,6–15,0	+/– 10 %

Width and length	Tolerance
< 50	+/– 0,5
> 50,0	+/– 1,0

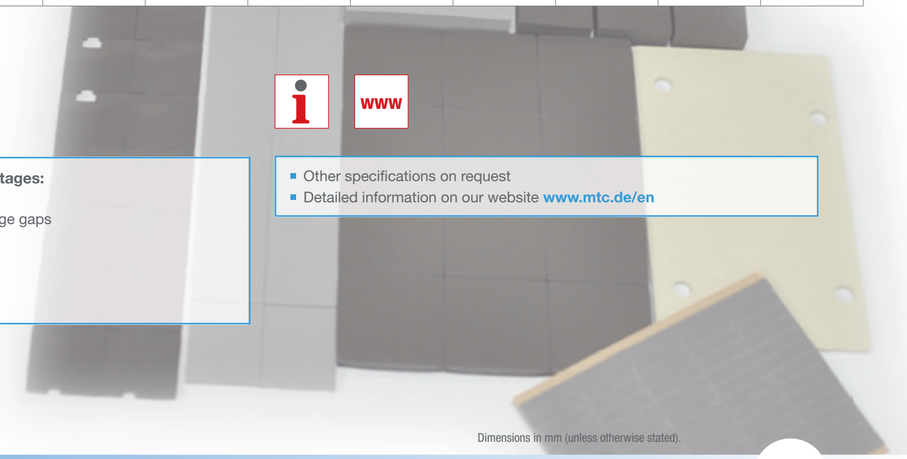
Item number	TCGF-1,0	TCGF-1,0S5	TCGF-1,5	TCGF-1,8	TCGF-2,5	TCGF-3,0	TCGF-5,0	TCGF-7,0	TCGF-8,0
Thermal conductivity (W/m*K)	1,0	1,0	1,5	1,8	2,5	3,0	5,0	7,0	8,0
Material thickness	0,5–5,0	0,5–5,0	0,5–5,0	0,5–5,0	0,5–5,0	0,5–5,0	0,5–5,0	0,5–5,0	0,5–5,0
Dimension standard sheet	297 x 210	297 x 210	297 x 210	297 x 210	297 x 210	297 x 210	297 x 210	297 x 210	400 x 300
Density (g/cm³)	2,3	1,6	2,5	2,55	2,95	2,95	3,2	3,2	3,5
Hardness (Shore00)	20–40	5	20–60	40–65	40–65	40–65	60–65	60–70	55
Temperature range (°C)	–50 to 200	–50 to 200	–50 to 200	–50 to 200	–50 to 200	–50 to 200	–50 to 200	–50 to 200	–40 to 200
Dielectric strength (kV/mm)	> 10	> 10	> 10	> 10	> 6	> 6	> 6	> 6	> 5
Volume resistivity (Ω*cm)	10^{13}	10^{13}	10^{13}	10^{13}	10^{11}	10^{11}	10^{11}	10^{11}	10^{13}

Gap fillers provide the following advantages:

- Compensation of small, medium and large gaps
- Excellent conformability
- Easy installation and handling
- Available in a variety of features
- Customer-specific cuttings possible

www

- Other specifications on request
- Detailed information on our website **www.mtc.de/en**



Thermally Conductive Gap Filler

Dimensions in mm (unless otherwise stated).

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Thermally Conductive Adhesive Tapes

Thermally conductive double-sided adhesive tapes are used as an alternative to thermally conductive paste and gap fillers. They are designed to bond heatsinks with heat-generating electrical components and guarantee not only an **efficient heat dissipation** but also **compensate gaps**.

The exceptional thermal characteristics of double-sided adhesive tapes are ensured by a filling with special, **highly conductive ceramic particles**. They convince by an **optimal heat dissipation** as well as an **excellent electrical insulation** by a high dielectric strength.

mtc provides **thermally conductive double-sided adhesive tapes** in various designs for **easy installation**. The use of additional fixing material is not necessary. An optimal thermal connection between the component and the heat sink is achieved directly after application by a **short curing time**.

Item number	TCAT-1,0	TCAT-1,5	TCAT-2,0
Thermal conductivity (W/m*K)	1,0	1,5*	2,0
Type of adhesive	acryl polymer	acryl polymer	acryl polymer
Filler	ceramic powder	ceramic powder with glass fiber reinforcement	ceramic powder
Density (g/cm³)	2,6	1,35	2,6
Hardness	60 Shore00	45 Shore A	60 Shore00
Dimension standard sheet	400 x 300	297 x 210	400 x 300
Thickness of material	0,3–2,0	0,1–0,5	0,3–2,0
Temperature range (°C)	–60 to 150	–45 to 120	–60 to 150
Breakdown voltage (kV/mm)	> 5	> 3,5	> 5
Colour	white	white	grey

* also available on rolls

Thermally conductive adhesive tapes provide the following advantages:

- High adhesion on surfaces
- Excellent wetting properties
- Very high temperature resistance
- Clean processing, no dirt
- Customer-specific cuttings possible

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- Other specifications on request
- Detailed information on our website **www.mtc.de/en**

Thermally Conductive Adhesive Tapes

Dimensions in mm (unless otherwise stated).

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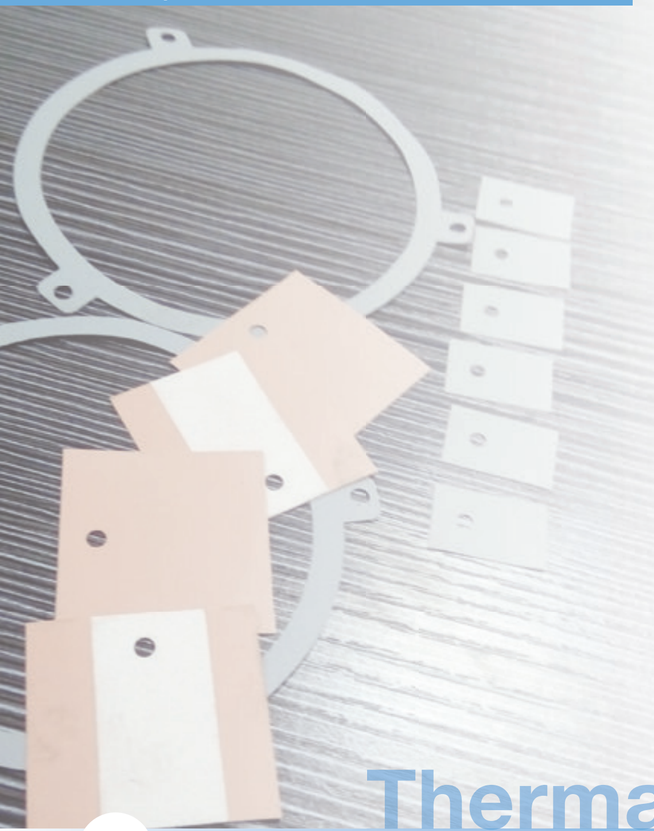

ISO 9001 14001 | RoHS ✓ | REACH ✓ | UL 94

Thermally conductive insulators are especially characterized by an **excellent dielectric strength** in addition to a **good heat dissipation**. Thereby they provide a **very good electrical insulation**.

Insulators are mainly used with power transistors, such as TO-220, TO-247 and IGBTs. They are suitable for applications where a **low mounting pressure** is required.

The material consists of **fibre glass reinforced silicone** and is available in **material thicknesses** from 0,18 to 10,0 mm. Depending on the material, the **thermal conductivity is between** 1,2 and 5,0 W/m*K.

Thermally Conductive Insulators

Item number	TCIN-1,2	TCIN-1,3	TCIN-1,5	TCIN-3,0	TCIN-3,6	TCIN-5,0	TCIN-7,0
Thermal conductivity (W/m*K)	1,2	1,3	1,5	3,0	3,6	5,0	7,0
Material	fibre glass reinforced silicone	polyester film with silicone coating	fibre glass reinforced silicone	fibre glass reinforced silicone	fibre glass reinforced silicone	fibre glass reinforced silicone	fibre glass reinforced silicone
Material thickness	0,18–0,45	0,2	0,25–0,60	0,25–0,60	0,50–10,00	0,25–10,00	0,50–5,00
Hardness	70 Shore A	80 Shore A	20–60 Shore00	40–65 Shore00	50 Shore00	45 Shore00	55 Shore00
Temperature range (°C)	–40 to 200	–40 to 180	–40 to 200	– 40 to 200	-40 to 200	– 40 to 200	– 40 to 200
Tensile strength (Kgf/cm²)	> 180	4000 psi	> 180	> 180	32	32	32 psi
Dielectric strength (kV/mm)	> 4	> 5	> 4	> 4	10	10	10
Density (g/cm³)	> 1,6	2,5	> 1,6	> 1,6	3,1	3,1	3,1
Colour	pink/grey/yellow	multicolored	pink/grey/yellow	pink/grey/yellow	multicolor	grey	grey

Thermally conductive insulators provide the following advantages:

- Excellent dielectric strength
- High mechanical resistance and long product life
- Very good workability
- High temperature resistance
- Customer-specific cuttings possible

- Other specifications on request
- Detailed information on our website **www.mtc.de/en**

Dimensions in mm (unless otherwise stated).

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Thermally Conductive Phase Change Material

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Thermally conductive Phase Change Material (PCM) is a **wax-based** thermal interface material. Its delivery state is solid and it begins to melt and flow at a temperature between 45°C and 55°C. Microscopic unevennesses between the heat source and the heat think are compensated and an optimal heat transfer is ensured.

Phase Change Material is sticky by nature, flexible and easy to use. It is available in **material thicknesses** from 0,06 to 0,5 mm, in **different colours** and various **delivery forms** like standard sheets or custom die-cut parts.

Thermally conductive Phase Change Material is an ideal replacement for thermally conductive paste.

Item number	TCPC-3,0	TCPC-5,0
Thermal conductivity (W/m*K)	3,0	5,0
Thermal impedance (K*cm²/W@50psi)	0,12	0,05
Material thickness	0,06–0,5	0,1–0,5
Density (g/cm³)	2,7	2,3
Phase change temperature (°C)	45–55	50–60
Working temperature (°C)	–25 to 125	–40 to 130
Standard sheet size	400 x 300	400 x 300
Colour	grey/yellow/pink	black

Phase Change Material provides the following advantages:

- Compensation of microscopic unevennesses
- Very low thermal resistance
- High dielectric breakdown strength
- Easy application
- Customer-specific cuttings possible

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- Other specifications on request
- Detailed information on our website **www.mtc.de/en**

Thermally Conductive Phase Change Material

Dimensions in mm (unless otherwise stated).

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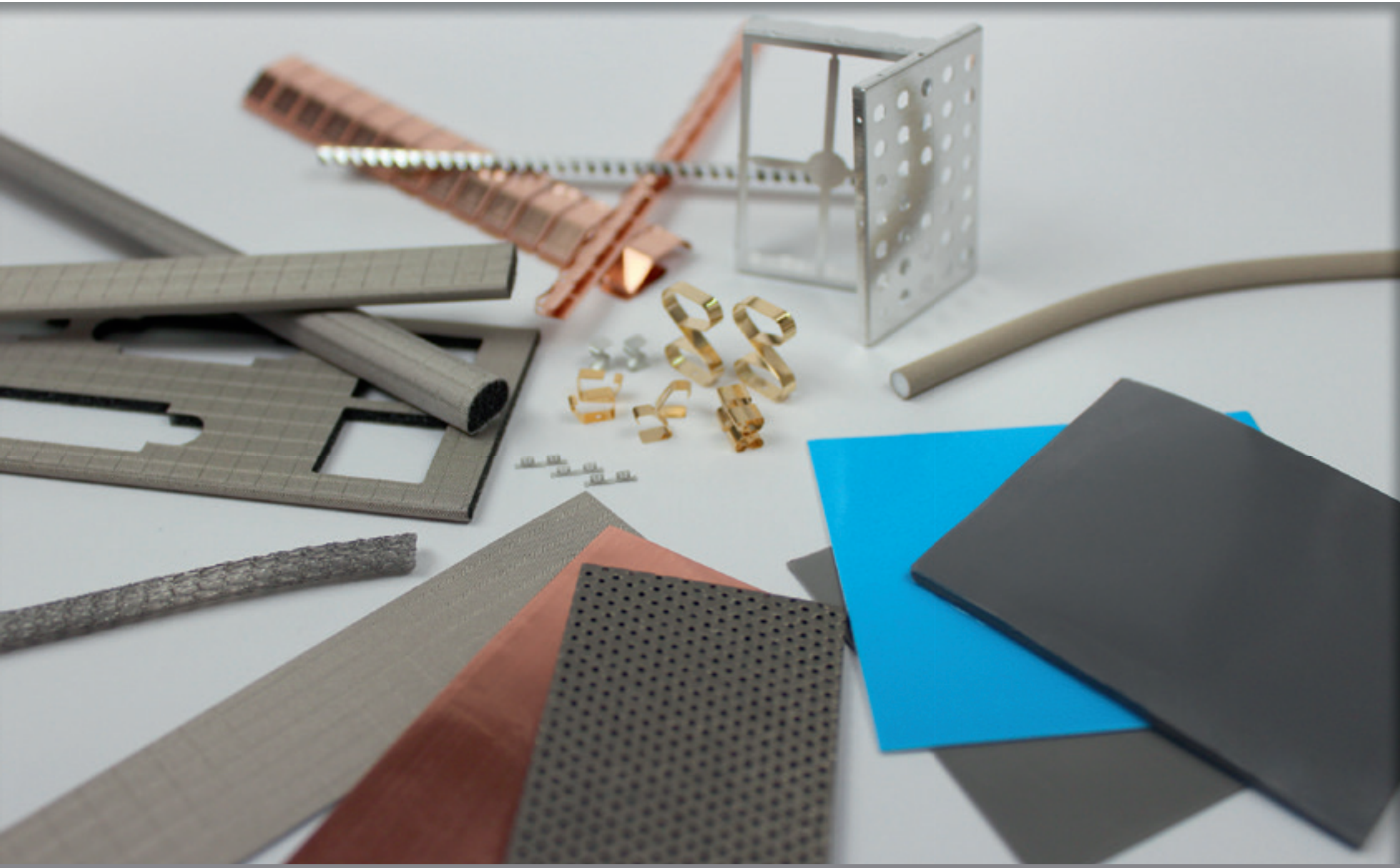
If you choose ***mtc*** as your supplier you will benefit not only from **our flexibility** and our **competitive prices** but also from our **long lasting experience** and **professionalism**. We are an **ISO 9001** and **ISO 14001** certified company.

The ratification of the relevant regulations **RoHS/WEEE** is an important issue in our industry. ***mtc*** has detected this early and was **one of the first providers** with appropriate solutions. Therefore **all our products** are without exception **RoHS compliant**. Of course, we also pay attention to the RoHS compliance of our suppliers. This is checked regularly by independet laboratories.

In order to comply with the European chemicals regulation **REACH**, our products are regularly tested by an independent laboratory.

A **UL certification** is mandatory for many of our customers for the worldwide sale of their products. Here you can rely on ***mtc***. Our products are, as far as possible, **tested according to UL 94**. We are ready to send you all required information so that you can verify this at UL. For ***mtc*** this transparency is self-evident!

Certificates



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