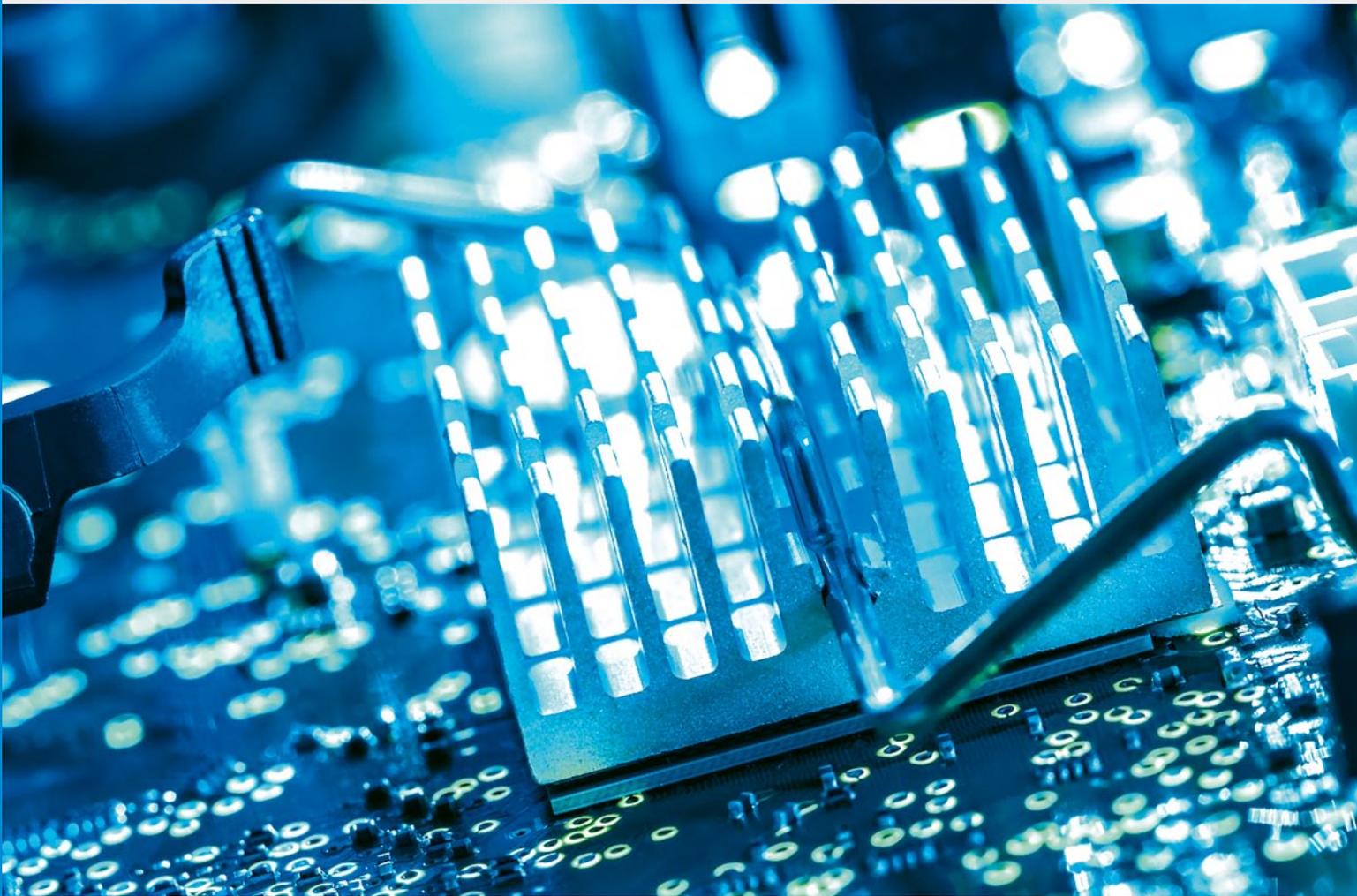


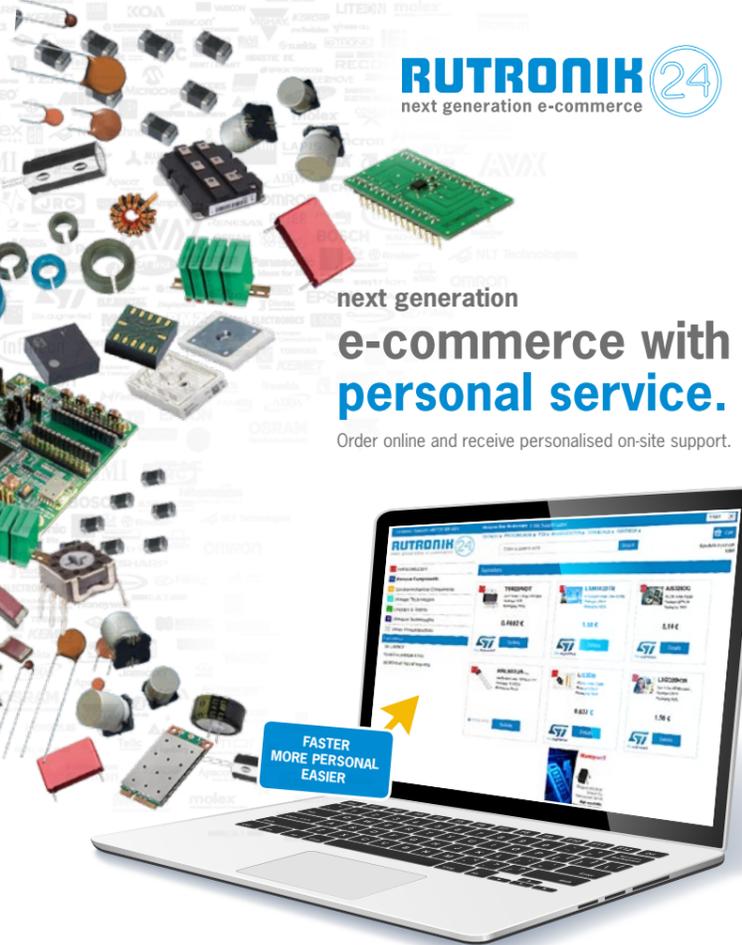
Committed to excellence

Thermal Management



V1.0

Solutions for
Heat Transmission



next generation
e-commerce with personal service.

Order online and receive personalised on-site support.

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Thermal Management

Electronic module malfunctions or failures are usually down to one particular reason: overheating. This is because performance and temperature are directly related to each other. The ongoing trend towards miniaturization and to an increasing efficiency are strengthening this challenge even more. Therefore thermal management should play an essential role already from the beginning of the product development cycle. A well-considered design helps to pave the way for efficient products with longer lifetime.

It's not easy to find out the best strategy for heat dissipation. The huge variety of products requires an individual analysis of the particular demands of our customers.

Rutronik will support you, keeping track of the latest trends and technologies in order to achieve the ideal solution for your individual needs.

This is based on the technical know-how and experience of our Product Managers and Field Application Engineers coupled with the innovative products from our comprehensive line card. The portfolio encompasses state-of-the-art fans, thermal interface materials such as thermally conductive film, phase change materials or gap fillers and heat sinks.

If you need to know which particular solution is best-suited to your application we will gladly assist you in defining the optimal components. Please don't hesitate to contact us.



Martin Unsöld
Senior Marketing Manager
Relays, Batteries, Fuses, Switches & Thermal Management

Our Product Portfolio

Semiconductors	Displays & Boards
Passive Components	Storage Technologies
Electromechanical Components	Wireless Technologies

Committed to Excellence

Consult – Know-how. Built-in.

The technical competence from Rutronik

Worldwide and individual consulting on the spot: by competent sales staff, application engineers and product specialists.

Components – Variety. Built-in.

The product portfolio from Rutronik

Wide product range of semiconductors, passive and electromechanical components, storage, displays & boards and wireless technologies for optimum coverage of your needs.

Logistics – Reliability. Built-in.

The delivery service from Rutronik

Innovative and flexible solutions: from supply chain management to individual logistics systems.

Quality – Security. Built-in.

Quality management without compromise

The integrated management system (IMS) encompasses quality control, environmental protection and occupational health and safety.

	3M	ADDA	ASSMANN thermal components	DELTA	JAMICON
Franchise Situation	Pan-European	Europe without Italy	Worldwide	Europe without Italy	Pan-European
AC Fans					★
DC Fans				★	★
CPU Cooler					
Blowers				★	
Heatsinks			★		
Heat Contacting Foils					
Heat Pads					

Suppliers Description	3M has a large division covering thermal management products	ADDA supplies a very wide range of fans	Supplier of heat sinks with more than 40 years experience	DELTA is the market leader in DC fans	Jamicon is a flexible supplier of DC and AC fans
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★ Focus program Product available

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JAMICON®

Brushless Fans provide Cooling Solutions on Your Demand

Kaimei Electronic Corp. was established in 1973, starting up with manufacturing and selling of electrolytic capacitors. Recently Jamicon has expanded their product line to a total 3 divisions, including AC/DC axis fans and LED drivers. Kaimei Electronic Corp. has been designing, developing and manufacturing a broad line of AC and DC fans since 1990 and distributing them worldwide under the brand name Jamicon.

Kaimei Electronic Corp. has ISO 9001 and ISO14001 certificated manufacturing facilities in their home country of Taiwan as well as in China and Malaysia. In order to provide their services to various industries, recently their Shenzhen factory has obtained certification of TS16949 in 2014.

As the electronics industry matured and diversified, Jamicon always upholds its strict quality control policy. We value our customers needs and will continually develop the products that meet your expectation.

General Specifications

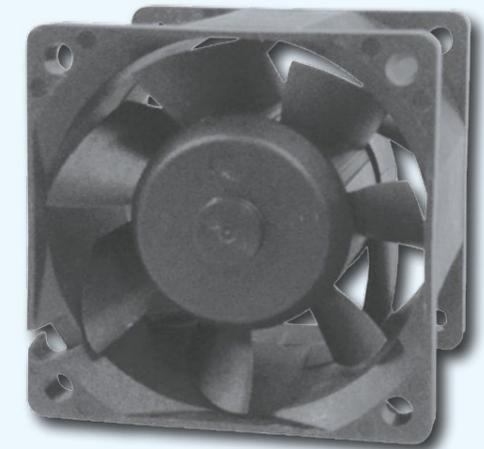
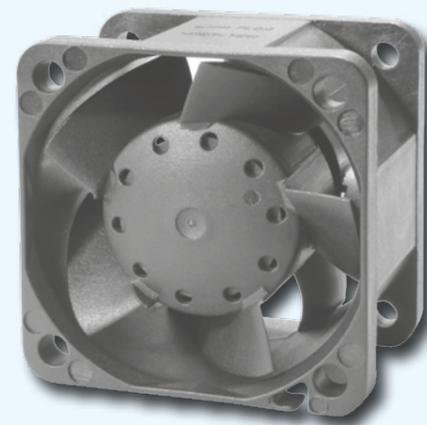
- Operating Temperature : -25°C ~75°C (Ordinary humidity)
- Storage Temperature : -40°C~70°C (Ordinary humidity)
- Insulation Resistance : 10M Ohm at DC 500 V
- Dielectric Strength : AC 700 V for 3 sec (<0.5 mA allowable, between lead and housing).
- Life Expectancy:
At ambient temperature 40°C and humidity 65%.
- Dual Ball bearing :
50,000~100,000 hours depending upon models and the environmental condition
- Locked Rotor Protection:
designed to meet UL, CUL and TUV
- Polarity protection: Reverse connection at the rated voltage will not cause any damage
- Insulation Class : UL Class A

Features

- Exceptional airflow performance and high static pressure
- Low power consumption for saving the energy
- Optional functions available up on request, including RD (Rotation Detection) signal, FG(Frequency Generation) signal output, Auto- Restart, PWM control input
- IP protection version are available up on request

Target Application

- Telecommunication
- Industrial PC/server/storage
- Industrial power supply/inverter
- Cloud systems
- Medical equipment
- Solar energy system
- Wind-power generator

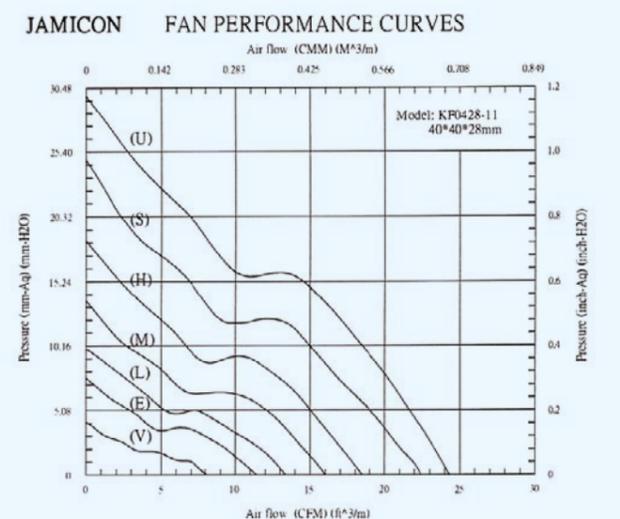


JAMICON®

High Performance Axial DC Fans

Dimension: 40x40x28 mm

Air Flow and Static Pressure Characteristics



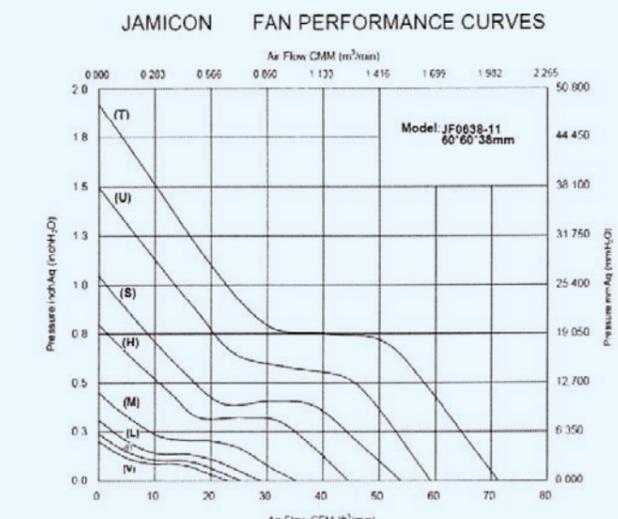
Model No.:

KF0428-11 Speed at 14000(12V) / 8000 (24V)R.P.M

Rated Voltage (V)	Max. Air Flow (CFM)	Max. Static Pressure (inchH2O)	Max. Power Consumption (Watt)	Noise (dBA)
12	24.34	1.177	7.68	54.1
24	13.39	0.395	2.64	40.9

Dimension: 60x60x38 mm

Air Flow and Static Pressure Characteristics



Model No.:

JF0638-11 Speed at 12000R.P.M

Rated Voltage (V)	Max. Air Flow (CFM)	Max. Static Pressure (inchH2O)	Max. Power Consumption (Watt)	Noise (dBA)
12	71.27	1.924	17.52	64.3
24			18.48	

** Above data is reference while fan operate at ultra high speed, other speeds requirement can be provided upon request.





JAMICON®

JAMICON®

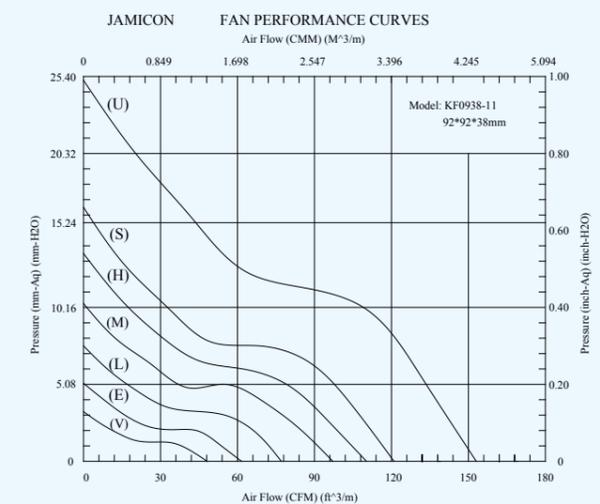
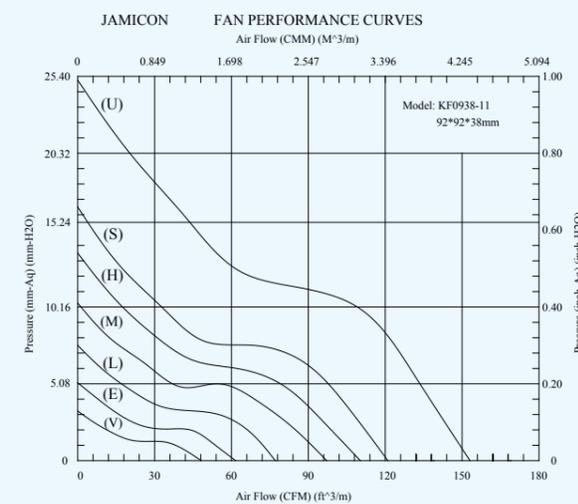
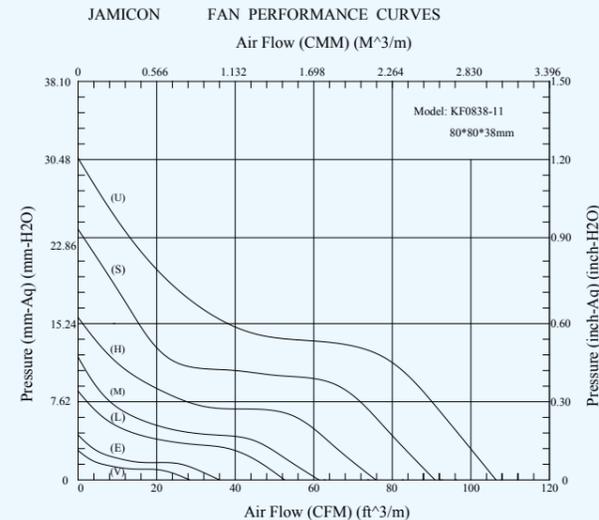
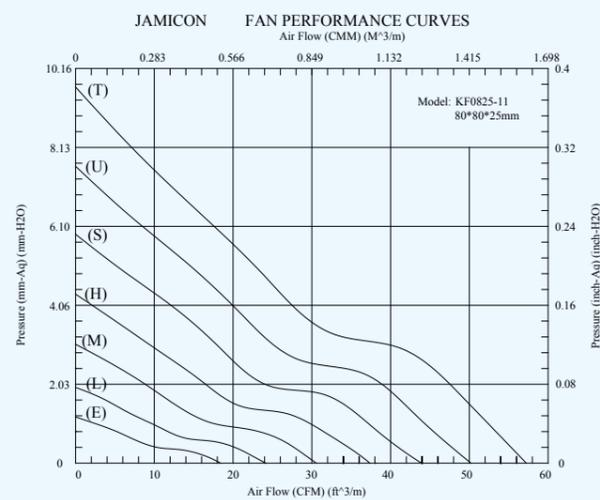
High Performance Axial DC Fans

Dimension: 80x80x25 mm
Air Flow and static Pressure Characteristics

Dimension: 80x80x38 mm
Air Flow and Static Pressure Characteristics

Dimension: 92x92x38 mm
Air Flow and Static Pressure Characteristics

Dimension: 120x120x38 mm
Air Flow and Static Pressure Characteristics



Model No.:
KF0825-11 Speed at 4500(12V) / 4000 (24V-48V)R.P.M

Model No.:
KF0838-11 Speed at 7000R.P.M

Model No.:
KF0938-11 Speed at 6000R.P.M

Model No.:
JF1238-14 Speed at 4000R.P.M

Rated Voltage (V)	Max. Air Flow (CFM)	Max. Static Pressure (inchH2O)	Max. Power Consumption (Watt)	Noise (dBA)
12	57.28	0.38	5.04	42.1
24	50.25	0.3	4.08	39
48			6.24	

Rated Voltage (V)	Max. Air Flow (CFM)	Max. Static Pressure (inchH2O)	Max. Power Consumption (Watt)	Noise (dBA)
12	106	1.23	18	60.3
24			16.8	
48			17.76	

Rated Voltage (V)	Max. Air Flow (CFM)	Max. Static Pressure (inchH2O)	Max. Power Consumption (Watt)	Noise (dBA)
12	153	0.99	22.08	61,7
24			21.12	
48			23.04	

Rated Voltage (V)	Max. Air Flow (CFM)	Max. Static Pressure (inchH2O)	Max. Power Consumption (Watt)	Noise (dBA)
12	163.86	0.63	15.96	52.9
24			14.4	
48			13.44	

** Above data is reference while fan operate at ultra high speed, other speeds requirement can be provided upon request.

** Above data is reference while fan operate at ultra high speed, other speeds requirement can be provided upon request.



Fans and Thermal Management

The Worlds No 1 in DC Fans



High Performance Axial DC Fans



As the world's largest manufacturer of fans and fan components, Delta design and build innovative cooling systems that perform at the highest levels – even in the harshest environments. The Delta Fan and Thermal product line offers a full range of axial fans, blowers, and thermal management products. Our unique, patented blade design and innovative structure greatly increases cooling performance and reduces system noise. Moreover, the highly efficient cooling and ventilation systems can be customized to fit the needs of almost any business. This is why Delta fans and thermal products can be found worldwide in various applications, serving a wide range of organizations and industries.

Reliability Testing

In order to provide the best quality products and highest satisfactions to customers, Delta has executed several laboratory accreditation tests to exam the products' performances, endurances under tough conditions and adopted robust construction to ensure the high reliabilities of products.

- Waterproof Test
- Package Drop / Bump Test
- Vibration and Earthquake Test
- Shock Test Highly Accelerated Life Test
- Gas Corrosion Test
- Sand and Dust Test Salty Spray Test
- Thermal Shock Test
- Temperature Test
- High Temperature Test
- Life Expectancy Test
- Electromagnetic Interference Test



Axial Blower

Features

- Lower noise, lower power consumption and higher efficiency than traditional blower fans
- Flexible and easy integration
- PWM signal speed control and speed signal output



High Performance Fan

Features

- Provides high airflow in a high impedance system
- Low vibration
- Optimization blade designed to fit applications
- High reliability



High Efficiency Fan

Features

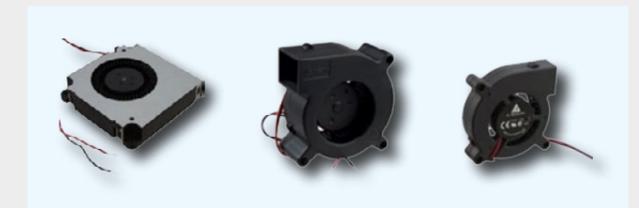
- Provides high airflow in a high impedance system
- Low vibration
- PWM signal speed control and speed signal output
- High reliability
- Energy saving



High Reliability Fan

Features

- Severe environmental and low power applications
- IEC 60529 and IEC68-2-52 / Bellcore compliant
- Damp/Heat: 85°C and 85% RH over 200hrs
- IP55 protection
- High reliability





A leader
in the thermal management field.

High Performance Axial DC Fans



Wide Range Air Flow Fan

Features

- Revolutionary blade design with a cone impeller
- Redundancy in parallel applications
- PWM signal speed control and speed control output
- High reliability



Fan Tray

Features

- Wide Input Range: 10Vdc ~ 75Vdc or 90Vac ~ 264Vac
- DC/DC or AC/DC converter built in for power converting
- Widely Applicative Fan: 12V/24V/48V
- Soft Start Function at Start Up
- Reverse Polarity Protection
- Hot-Swap Inrush Current Protection
- Over Voltage & Under Voltage Lock out
- Over Current protection
- Thermal Detect and Fan Speed Control
- Communication Function: I2C, RS232, RS485...etc.
- Redundancy Function
- Power Filter for EMI Prevention



Cooling Solutions by Adda



New Effectual DC Blower Fan

AB12212UB450300

ADDA's effectual DC blower fan has re-designed suction structure in a flat mouth shape that enhances static pressure over 30% comparing from the same series of fans. The market of traditional vacuum sweeping machine with brushed motor is around at 85%. ADDA's customization service provides vacuum cleaning machine with brushless motor that lengthens product life expectancy over 140% and increases the efficiency of merchandise more than 30%.



Appication:
Sweeping Robot



Electrical Commutated (EC) Fan

Features

- Brushless DC motor fan driven by AC source
- Excellent performance
- More efficient than traditional AC fan
- Speed controlled by PWM or voltage
- Equipped with PFC, EMI filter, motor controller and communication Interface
- ErP Compliances



Cooling Fan Solutions for Automotive Applications

DC Fan – AG4020 e.g. for LED car headlights:

Features

- Operating temperature: -40°C to +105°C
- IC according AEC Q100
- Balancing grades according ISO 1940 G6.3
- Temperature cycling lifetime
- Part Number: AG04012XB205300

Appication:
LED Car Headlights



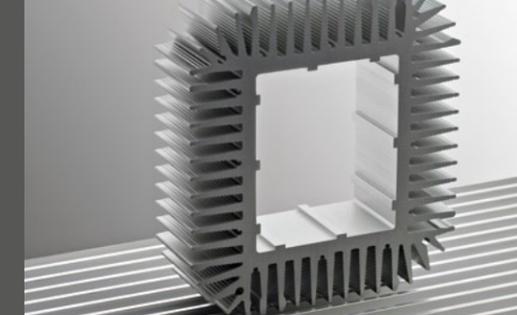
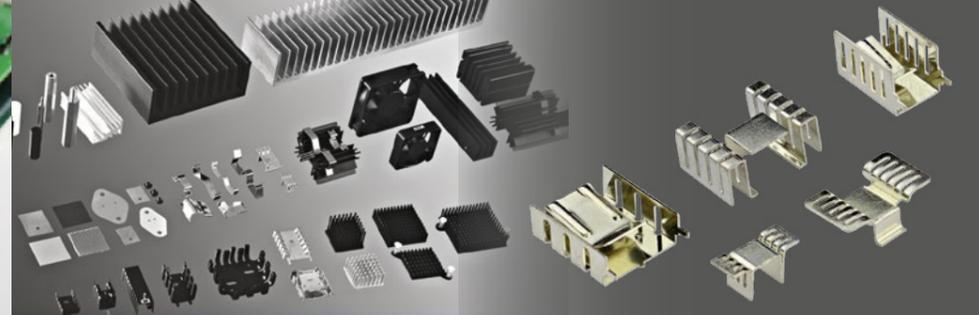
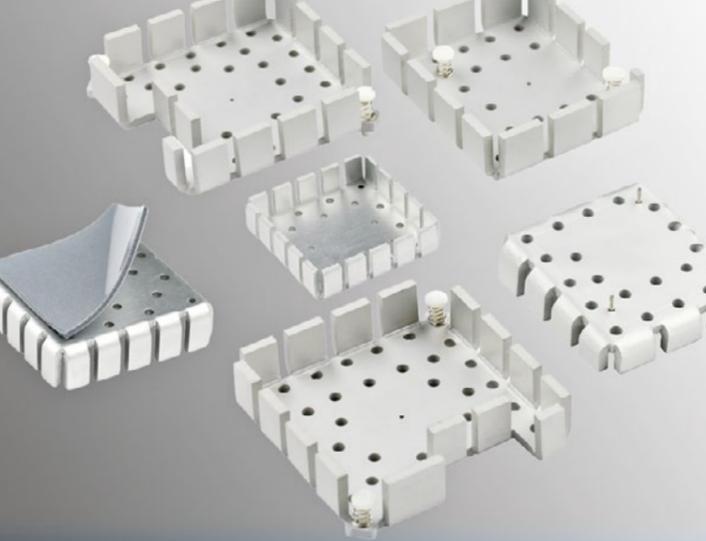
DC Fan for Battery Electric Vehicles

Features

- Twins structure
- Operating temp.: -40°C to +105°C
- IC according AEC Q100
- Space compression 30%
- High air flow & high pressure design
- Energy saving 15%
- Speed 11,000RPM, Performance upgrade 20%

Appication:
Hybrid Vehicles





Heatsinks

STAMPED CPU heat sinks - Improved features for traditional passive cooling systems

In addition to the existing CPU heat sinks, which have been successfully established over years, ASSMANN WSW has developed an optimized version to improve the features for traditional passive cooling systems.

STAMPED CPU Heat Sinks

STAMPED CPU heat sinks have a smaller surface than the traditional CROSS CUT version, but they bring equal or even better thermal energy flow in a passive cooling system.

For traditional CPU heat sinks inner cooling fins generate heat accumulation which results to less air flow based on heat radiation. The design of STAMPED heat sinks create an improvement of air convection to optimize the exchange of heat with the ambient air.

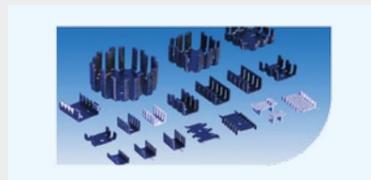
Advantages

- Geometry: Optimized heat sinks shape to improve the thermal management within passive systems
- Material: Aluminium alloy AL5052 or AL1050
- Mounting options
 - Push pins (pic.1)
 - Solder pins (pic.2)
 - Thermal tape (pic.3)
- Modification: Customized cut out can be implemented to optimized the used space on PCB; components can be located close to the heat sink (within the cut out area) to optimize the heat dissipation. Also for already existing PCB layout, a "bigger" heat sink can be used by positioning the heat sink closer to the active components which has to be cooled (pic.4)
- Customer Tailored: Special requirements such as material thickness, modifications of all dimensions, hole pattern, cut outs and perforations, surface treatments, special packing



Finger- and U-Shaped heat sinks

- Finger and U-Shaped heatink for transistors in TO-220/SOT-32/D-PAK etc. packages
- Different thickness and surface for SMD mounting
- Special treatment on request
- Material: aluminium and copper available



Attachable heat sinks

- Large range of standard products
- With solder pins in straight or angled version
- For single gauge packages (TO-220 package with fixing tab thickness 0,5mm)
- Material: AL99,5; C1100



Heat sinks with solder pins

- Large range of standard products
- Extruded profiles with different pressed in solder pins
- Black anodized surface finish
- Thermal resistance 6 to 16 K/W
- Aluminium alloy AL6060 & AL6063



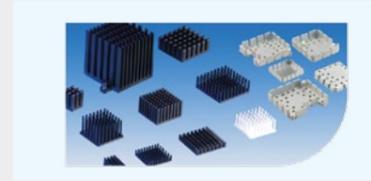
Heat sinks in standard length

- Machined extruded heat sinks in standard length
- Special heat sinks for Euro Cards
- Profiles incl. extruded M3 thread
- For thermal resistance 2 to 40K/W
- Material AL6063, AL1100, AL1050



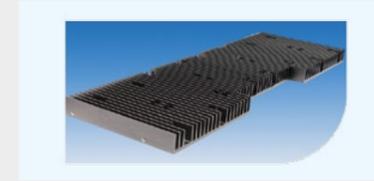
CPU heat sinks

- Available in cross cut, round pin or stamped version for BGA, PGA GPU units
- Mounting via thermal adhesive foil, glue, clips, push pins and soldering
- Special shape and treatment on request
- Material AL6063, AL1100, AL1050



Extruded profiles

- Large range of standard profiles
- Flatback profiles, cannellure fin profiles
- Double sided fin profile w. or w/o gab
- Profiles with extruded thread canal
- Specialized on customized profiles
- Aluminium alloy AL6060 & AL6063



Retaining spring

- Large range of retaining springs
- Easy mounting of semiconductors
- No drilling, tapping or screw mounting necessary
- Safe and constant clip pressure
- ASSMANN WSW profile clip system



Mounting accesiores

- Thermal compount, adhesive foil, glue
- Large range of different distance spacers, with or w/o threads
- Materials: steel, brass, plastic
- Stand offs for transistor package
- Insulating washers and mica wafers



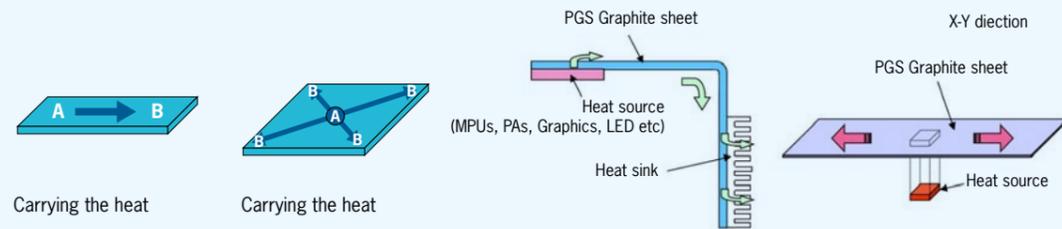
Heat sink special treatment

- Certified manufacturing in Slovakia and Asia to DIN EN ISO 14001 & 9001
- CNC-, drilling- and punchingmachines
- Surface finish to customers request
- Experience in decoration parts
- Very flexible in customers changes



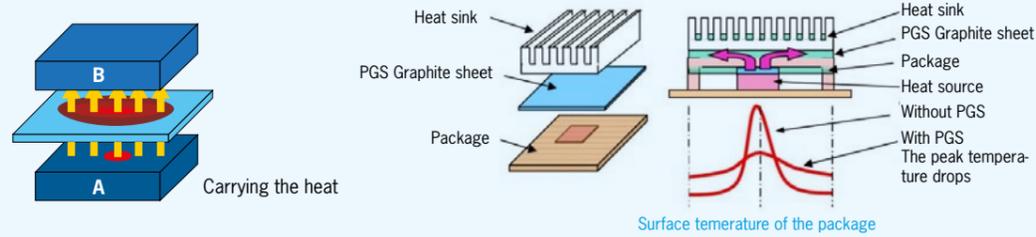
Thermal Transfer

PGS film is used to transfer heat away from a heat source, or to diffuse or spread heat away from a hot spot (A>B).



Thermal Transfer

It can also be used as a highly-efficient thermal interface material.



Solving Thermal Management Challenges in a Minimum Space



Heat Conducting Films and Adhesives 3M™ Thermally Conductive Adhesive Transfer Tapes



Electronic Equipment Needs an Efficient Means of Managing and Dispersing Heat as Systems continue to Shrink in Size

Pyrolytic Graphite Sheet (PGS) is a new, ultra-light graphite interface film material, developed by Panasonic, which has a thermal conductivity up to five times greater than copper. It is pliable enough to be cut and folded into complex three dimensional shapes then simply stuck onto the heat source to diffuse the heat or provide a path for heat to flow to a cold wall. It is produced from polymeric film using a heat de-composition process which creates at the end a structure close to a single crystal. The hexagonal crystal structure of graphite is arranged uniformly in a horizontal 2D structure.



Features

PGS has a number of features which make it highly suitable as an easy-to-use, space-saving, thermal management solution:

- It is very thin – available in a range of thicknesses from 100µm down to 10µm – and has excellent thermal conductivity from 700 to 1950W/m.K which is two to five times higher than copper and up to seven times better than aluminum.
- The material is very stable so it is resistant to environmental effects and shows no deterioration with age.
- It is flexible and pliable so it can be easily cut and folded into a complex shape. With a bend radius of 2mm, sheets can be bent through 180 degrees more than 3000 times, and its thermal conductivity is unaffected if sharp folds are avoided.
- PGS can provide some shielding to electromagnetic noise, providing a simultaneous EMI and thermal solution.

The efficacy of PGS in reducing IC hot spot temperatures is demonstrated in the figure below. The temperatures at the ABS (Acrylnitril-Butadien-Styrol) surface, the IC and the PCB are shown for two different 70 µm thick PGS sheet sizes.

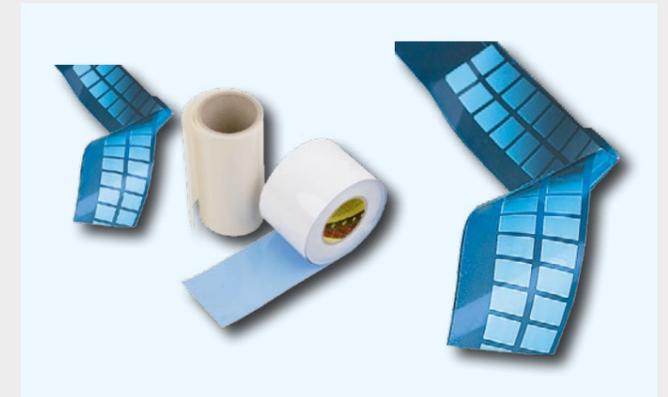
Application Example of PGS (Simulation with heat)

Heat distribution of the ABS surface with PGS70µ: Diffused the heat and broke the heat spot

Model	Type A	Type A-1	Type A-2	Type B	Type B-1	Type B-2
PGS size (mm)	without	25x40x0.07 (large)	25x25x0.07 (small)	without	25x40x0.07 (large)	25x25x0.07 (small)
Silicon	with	with	with	without	without	without
Result						
Temp. (°C)	Surface: 99.85 IC: 101.9 PWB: 96.25	Surface: 83.84 IC: 88.89 (-13.0) PWB: 85.31	Surface: 89.08 IC: 93.26 (-8.6) PWB: 89.06	Surface: 93.65 IC: 103.2 PWB: 97.26	Surface: 77.17 IC: 99.76 PWB: 94.19	Surface: 80.86 IC: 100.96 PWB: 95.31

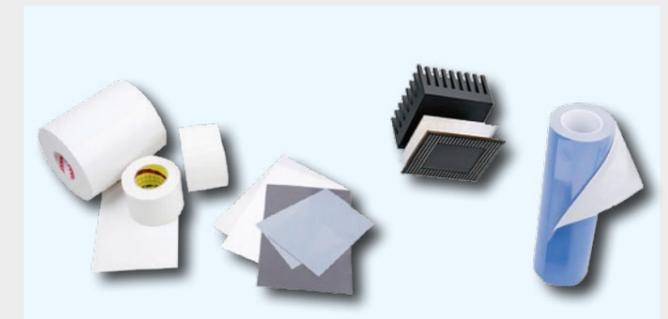
3M™ Thermally Conductive Adhesive Transfer Tapes

This range of high adhesion thin tapes offers efficient thermal transfer for a wide range of applications requiring a thermal management solution: bonding heat sinks, heat spreaders and other cooling devices to IC packages, power transistors, and other heat generating components. Each tape combines 3M high performance acrylic adhesive with highly conductive ceramic particles for an extremely reliable and user-friendly thermal interface. Highly conformable construction provides excellent wet-out on surfaces. Select 5, 10 and 20 mil thicknesses to meet application requirements.



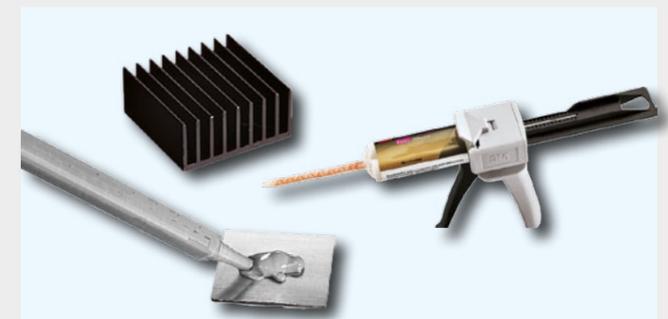
3M™ Thermally Conductive Interface Pads

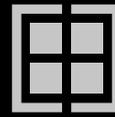
Through innovative 3M technology, these soft and conformable pads provide high levels of conductivity for the more demanding applications in the electronics industry. The pads provide excellent handling and can be die cut to fit most applications.



3M™ Thermally Conductive Epoxies

This range of liquid adhesives has less odor and good structural strength adhesion. Dispensing is easy for high output, in-line automated manufacturing and manual application. Adhesive flows and fills micro-spaces on surfaces. Ultra-thin bond line helps achieve low thermal impedance





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