

TEPOWER



AC-DC and DC-DC

Power supply units

Made in Russia

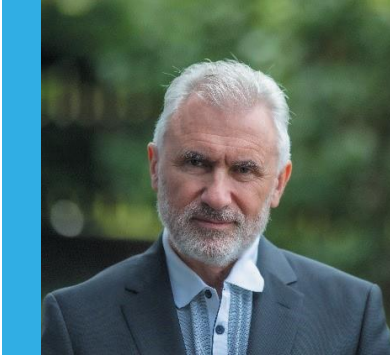
2022-2023

Our motto:

«Always choose the most difficult path – you will not meet competitors there»

Charles de Gaulle

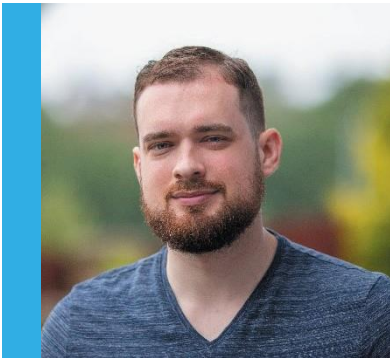
Administration Alexander Electric s.r.o.



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ALEXANDER ELECTRIC s.r.o. was founded in Prague, Czech Republic, in 2006, as a group for design, experimental production and supply of components to Russian companies - AEIEP, LLC and AEDON, LLC founded by Alexander Goncharov.

In 2015, **ALEXANDER ELECTRIC s.r.o.** became an independent company, uniting AEPS-GROUP s.r.o., and GONCHAROV ELECTRIC JET s.r.o. in Czech Republic and **TE LLC (TESLA ELECTRIC)** and **AEPS GROUP LLC** in Russia, today these companies act as a group of companies AEPS-GROUP.

Today **ALEXANDER ELECTRIC s.r.o.** specializes in development and production of flat planar fanless AC/DC and DC/DC power supply units designed to perform critical missions due to their unique specifications when operating under extreme operating conditions.

In 2020, **ALEXANDER ELECTRIC s.r.o.** granted **TE LLC** the right to conduct local production of individual series of products on the territory of the Russian Federation with the right to export.

This product catalog includes a series of AC/DC and DC/DC power supply modules manufactured by TE LLC (Voronezh), designed for the Russian and foreign markets.

Basic specifications of AC-DC and DC-DC power supply units made in Russia

PARAMETER	DC/DC TESD	DC/DC TESDs	DC/DC TESH	AC-DC/DC TESAV	AC-DC/DC JETAs
Maximum power range, W	5...200	5...100	50...1000	50...1000	30...1200
Maximum power density, W/in ³	39W/in ³	64W/in ³	59W/in ³	59W/in ³	25W/in ³
DC "28W" 16...50 V trans. 80 V	+	+	-	-	-
DC "12W" 10,2...36 V trans. 80 V	+	+	-	-	-
DC "24W" 18...75 V trans. 80 V	+	+	-	-	-
DC "48W" 9...80 V trans. 100 V	-	+	-	-	-
DC "110" 66...160 V trans. 170 V	-	-	+	-	-
DC "150W" 110...375 V trans. 450 V	-	-	+	-	-
DC "230" 175...342 V no trans.	-	-	+	+	+
DC "270" 240...425 V trans. 450 V	-	-	+	-	-
AC "~115" ~80...~138 V trans. ~150 V	-	-	-	+	+
AC "~230W" ~100...~242 V no trans.	-	-	-	+	+
I out max 2A	+	-	-	-	-
I out max 3A	+	+	-	-	-
I out max 5A	-	+	-	-	-
I out max 6A	+	-	-	-	-
I out max 10A	+	-	-	-	-
I out max 12A	-	+	-	-	+
I out max 20A	+	+	+	+	-
I out max 24A	-	-	-	-	+
I out max 30A	-	-	+	+	+
I out max 40A	+	-	-	-	-
I out max 42A	-	-	+	+	-
I out max 50A	-	-	-	-	+
I out max 60A	-	-	-	-	+
-50 ... +85 °C	-	-	-	-	+
-60 ... +110 °C	+	+	+	+	-
ON/OFF	+	+	+	+	+
Parallel Operation	+	-	+	+	-
Remote sense	-	-	+	+	+
Conditional price at the same	\$	\$\$	\$\$	\$\$\$	\$\$\$

TESDs series, 5 W - 100 W, planar DC-DC modules with an ultra-wide DC network of 48W (9...80 V), reinforced metal cases with flanges, critical applications, -60...+110°C



TESDs series features:

1. Aluminum or copper cases with the same overall and connecting dimensions as the models of older generations, which can be replaced by this series due to significant improvement of the basic specifications.
2. Wide selection of input supply networks: 48W (9...80)V, 12W(10.2...36)V and 24W (18...75)V
3. High efficiency with ultra-wide range of case operating temperature from -60 to +100°C.
4. The possibility of implementing a two-channel output with galvanically isolated channels, which allows them to be connected in series to obtain a high-voltage output.

DC-DC power supply units of TESDs series can operate both in protected sealed and unprotected compartments of flying and stationary objects at low, medium, and high altitudes. They can be used in all types of ground transport, i.e. railway, automobile, and tracked types of vehicles. They can be used in marine equipment, and are the best choice for telecommunication facilities, supercomputers, radars, as well as for high power information display screens, electric vehicle charging stations, etc. These units can operate in very wide ambient temperature range, wherever a conductive heat sink or a combination of conductive and forced-air cooling can be used.

Apart from standard operation the power supply units of this series are adapted for critical missions: operation in emergency conditions, under the loss of tightness of hardware compartment, as well as in salt fog, sand contamination, with vibration, and mechanical shock effects.

TESDs series includes TESDs15, TESDs25, TESDs50 and TESDs100

Electrical advantages: The modules work with three input network options: 48W (9...80) V, 12W (10.2...36) V and 24W (18...75) V. All Tests modules with an input network of 12W contain synchronous rectifiers up to an output voltage of 24 V, which increases their efficiency. The modules have a standard set of service functions, up to parallel operation in high-power models. A high efficiency of up to 93% allows the maximum operating temperature range on the housing to be -60 ...+110°C.

Design advantages: The TESDs series modules are very small in size, which, combined with high efficiency, allows them to allow an energy density of up to 64 W/in³. The modules have mounting heat-removing flanges, which in some cases allow the modules to be used without a radiator. The housing of the modules has stiffeners and at the same time serves for conductive heat removal. Considering that all components are structurally connected to the body and filled with a rigid heat-conducting compound, the resistance and strength to mechanical influences is unique. The table below shows basic parameters of TESDs series.

The table below shows basic parameters of TESDs series.

***This series replaces the modules of previous series TESD, TESND as well as modules from other companies in similar cases of the MDM series.**

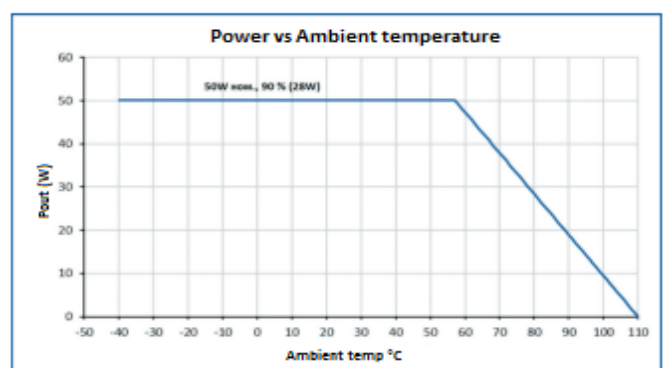
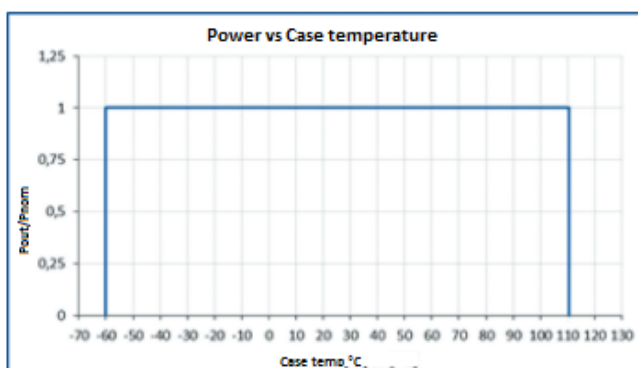
Unit Type	Maximum power when ordering, W	Dimensions, mm without flanges	Maximal output current, A	Power density, W/in ³	Number of outputs	Input 48W (9-80 V) transient 100 V	Input 12W (10,2-36 V) transient 80 v	Input 24W (18-75 V) transient 80 V	Insulation input-output, kV	Remote ON/OFF	Trimming	EMC Standards	
												Additional filtration to improve EMC profile	MIL-STD-461 CE
TESDs15	10, 15	30x20x10	3	41	1, 2	●	●	●	=1.5	●	●	JETDF2.5	●
TESDs25	20, 25	40x30x11	5	31	1, 2	●	●	●	=1.5	●	●	JETDF5	●
TESDs50	40, 50	48x33x11	10	47	1, 2	●	●	●	=1.5	●	●	JETDF10	●
TESDs100	80, 100	58x40x11	20	64	1, 2	●	●	●	=1.5	●	●	JETDF20	●

Notes: ● - available, ✕ - on request, the standard version of the input voltage is highlighted in blue.

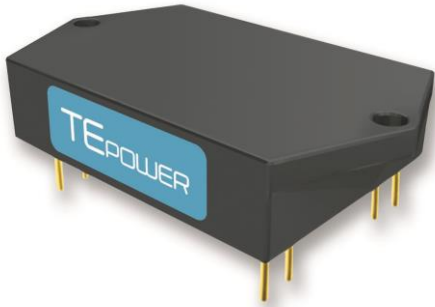
Possible cooling methods

These modules work with a conductive heat sink or with the use of forced-air cooling. In some cases, its own convection heat sink from the module housing is allowed - for TESDs15, TESDs25, TESDs50 and TESDs100.

For example, the temperature graphs of the **TESDs50** module without an additional radiator are given when the body temperature is controlled and maintained no higher than 125 °C, as well as the dependence of the output power at ambient temperature in the absence of a radiator. At the same time, when the ambient temperature rises, it is necessary to reduce the output power.



TESD series, 5W-200W, planar DC-DC modules, reinforced metal cases with flanges, critical applications, -60...+110°C



TESD series features:

1. Aluminum or copper cases with the same overall and connecting dimensions as the models of older generations, which can be replaced by this series due to significant improvement of the basic specifications.
2. Wide selection of input supply networks: 48W (9...80) V, 12W (10.2...36) V and 24W (18...75) V.
3. High efficiency with ultra-wide range of case operating temperature from -60 to +100°C.
4. The possibility of implementing a two-channel output with galvanically isolated channels, which allows them to be connected in series to obtain a high-voltage output.

DC-DC power supply units of **TESD** series can operate both in protected sealed and unprotected compartments of flying and stationary objects at low, medium, and high altitudes. They can be used in all types of ground transport, i.e. railway, automobile, and tracked types of vehicles. They can be used in marine equipment, and are the best choice for telecommunication facilities, supercomputers, radars, as well as for high power information display screens, electric vehicle charging stations, etc. These units can operate in very wide ambient temperature range, wherever a conductive heat sink or a combination of conductive and forced-air cooling can be used.

Apart from standard operation the power supply units of this series are adapted for critical missions: operation in emergency conditions, under the loss of tightness of hardware compartment, as well as in salt fog, sand contamination, with vibration, and mechanical shock effects.

TESD series includes TESD10, TESD15, TESD30, TESD60, TESD100 and TESD200

Electrical advantages: The modules work with three input network options: **48W** (9...80) V, **12W** (10.2.36) V and **24W** (18.75) V. All Tests modules with an input network of 12W contain synchronous rectifiers up to an output voltage of 24 V, which increases their efficiency. The modules have a standard set of service functions, up to parallel operation in high-power models. A high efficiency of up to 93% allows the maximum operating temperature range on the housing to be -60 ...+110°C.

Design advantages: The TESP series modules are very small in size, which, combined with high efficiency, allows them to allow an energy density of up to 39 W/in³. The modules have mounting heat-removing flanges, which in some cases allow the modules to be used without a radiator. The housing of the modules has stiffeners and at the same time serves for conductive heat removal. Considering that all components are structurally connected to the body and filled with a rigid heat-conducting compound, the resistance and strength to mechanical influences is unique. The table below shows basic parameters of TESP series.

The table below shows basic parameters of this series.

***This series replaces the modules of previous series TESP as well as modules from other companies in similar cases of the MDM series.**

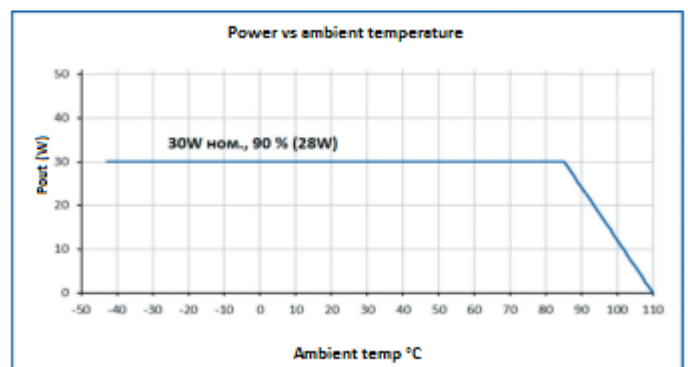
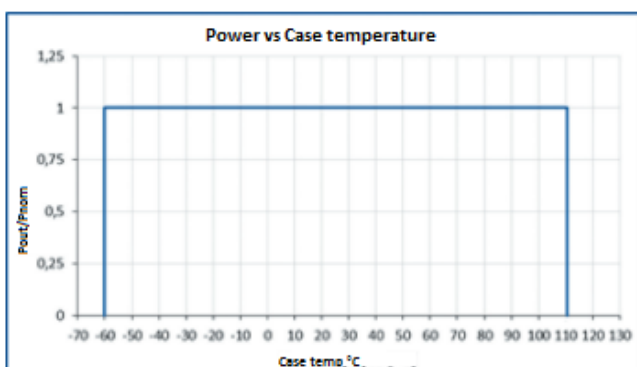
Unit type	Maximum power when ordering, W	Dimensions, mm without flanges	Maximal outpour current, A	Power density, W/in ³	Number of outputs	Input 28W (16-50 V) transient 80 V	Input 12W (10,2-36 V) transient 80 V	Input 24W (18-75 V) transient 80 V	Insulation input-output, kV	Parallel operation	Trimming	EMC Standards	
												Additional filtration to improve EMC profile	MIL-STD-461 CE
TESD10	5, 10	30x20x10	2	27	1,2	●	●	●	=1.5		●	JETDF2.5	●
TESD15	10, 15	40x30x11	3	18	1,2	●	●	●	=1.5		●	JETDF5	●
TESD30	20, 30	48x33x11	6	28	1,2	●	●	●	=1.5		●	JETDF10	●
TESD60	40, 60	58x40x11	12	38	1	●	●	●	=1.5		●	JETDF20	●
TESD100	80, 100	73x53x13	20	32	1	●	●		=1.5		●	JETDF20	●
TESD200	150, 200	95x68x13	40	39	1	●	●		=1.5	●	●	External	●

Notes: ● - available, ✖ - on request, the standard version of the input voltage is highlighted in blue.

Possible cooling methods

These modules work with a conductive heat sink or with the use of forced-air cooling. In some cases, its own convection heat sink from the module cases is allowed – for TESD10, TESD15, TESD30, TESD60, TESD100.

For example, the temperature graphs of the **TESD30** module without an additional radiator are given when the body temperature is controlled and maintained no higher than 125 °C, as well as the dependence of the output power at ambient temperature in the absence of a radiator. At the same time, when the ambient temperature rises, it is necessary to reduce the output power.



JETAs series, 30 W - 1200 W, single-phase planar fanless AC-DC modules, milled case base, critical applications -50...+85°C



Features of JETAs series:

1. Metal milled housings, in overall and connecting dimensions, coinciding with the models of previous generations TESA40-TESA1000, JETA60-JETA1200 and replacing them with a significant improvement in performance.
2. The maximum heights of the modules of this series are from 19 mm (30 W) to 38 mm (1200 W)
3. Ultra-wide operating temperature range of case is -50...+85°C
4. Dual-zone module temperature sensor
5. Operation with single-phase AC input networks in the frequency range 50...400 Hz, as well as the ability to work with DC networks, regardless of polarity.

AC-DC power supply modules of the JETAs series work both in protected sealed compartments and in unprotected ones - in the equipment of flying and stationary objects at low and medium altitudes, in all types of ground transport: railway, automobile, tracked. They can be used in marine equipment, are optimal for telecommunications facilities, for supercomputers, radars, as well as for information display screens, etc. These modules operate in conditions with a very wide temperature range of the environment, wherever a conductive heat sink or a combination of conductive and forced-air cooling is possible.

Modules, in addition to standard work, are adapted for critical missions: work in emergency conditions, work in violation of the tightness of the equipment compartment, with salt fog, with sand contamination, with vibrations and mechanical shock effects.

JETAs series includes: JETAs60, JETAs120, JETAs300, JETAs700, JETAs1200 modules.

Electrical Advantages: All single-channel JETAs modules contain synchronous rectifiers up to an output voltage of 24 V, which significantly increases their efficiency. The implementation of a two-channel output with galvanically isolated channels provides a unique possibility of circuit switching in all four possible variants: independent two channels, channels connected in parallel, channels connected in series to obtain a high-voltage output, an output with a midpoint. Starting from 300 watts, all modules have PFC, contain a standard set of service functions, up to parallel operation.

Design advantages: JETAs series modules do not have fans, combine small dimensions and high efficiency. This allows them to reach an energy density of up to 25 W/in³. All components having a noticeable weight are structurally connected to the base and filled with a heat-conducting compound - resistance to mechanical influences is good.

Starting from an output power of 300 W or more, the modules use a two-zone temperature sensor, one control zone is the lower area next to the base, the second control area is in the upper part of the module under the cover. This makes it possible to solve the problems of the so-called thermal pockets in the operating area of the module, for example, under its casing and increases durability.

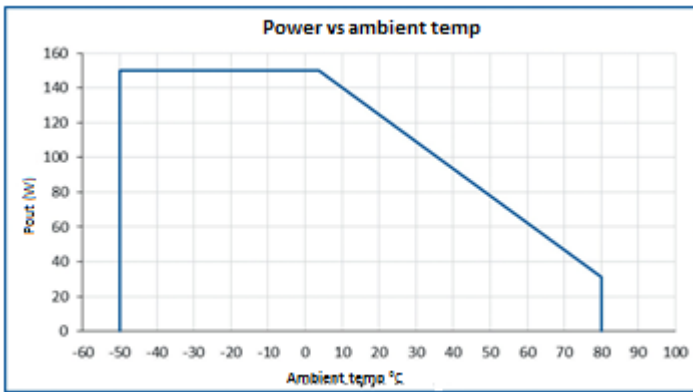
The table below shows basic parameters of this series.

*** This series meets the typical industrial standard of cases and terminals, and replaces popular power supplies of many manufacturers with improved basic specifications.**

Unit type	Maximum power when ordering, W	Dimensions, mm	Maximum output current, A	Power density W/in ³	Number of outputs	Input ~115 (~80-138 V) transient ~150 V	Input ~230W (~100-242 V) Without transient	Insulation input-output, kB	Dual-zone temperature sensor	Trimming	EMC Standards		
											EN55022 RNS P51318.22 Class B	EN55022 RNS P51318.22 Class A	MIL-STD-461 CE
JETAs60	30, 40, 60	100x51x19	12	10	1,2	×	●	~3			●		●
JETAs120	80, 100, 120	110x61x21	24	14	1,2	×	●	~3			●		●
JETA300s	150, 250, 300	134x84x28	30	16	1,2	×	●	~3	●	●	JETAF5	●	●
JETA700s	400, 600, 700	175x93x29	50	25	1,2	×	●	~3	●	●	JETAF10	●	●
JETA1200s	800, 1000, 1200	211x117x38	60	21	1	×	●	~3	●	●	JETAF10	●	●

Notes: ● - available, the standard version of the input voltage is highlighted in blue.

Possible cooling methods



The first three models JETAs60, JETAs120 and JETAs300 can be used without an additional radiator in accordance with the schedule below (example JETAs120) - for example, in the form of an instrument cabinet located on a metal wall (preferably using a heat-conducting paste). At the same time, when the ambient temperature increases, it is necessary to reduce the output power

The more powerful JETAs700 - JETAs1200 modules are designed only for use with conductive cooling using an aluminum or copper radiator-plate or with forced air blowing or with a convection radiator with a vertical arrangement of fins for easy passage of air between the fins from bottom to top. Most of the heat generated by the module (93-95%) is concentrated on the lower surface of the housing, on the sole, designed for articulation with the surface of the radiator plate or with the base of the ribbed radiator.

TESAV(H) series, 50 W - 1000 W, planar AC-DC/DC-DC modules, reinforced metal housings with flanges, high-voltage input, -60...+110°C



TESAV(H) series features:

1. Aluminium or copper housings with mounting flanges.
2. High efficiency with ultra-wide range of case operating temperature from -60...+110°C.
3. Operation with AC input networks (with an external filter capacitor): ~230W (~100...264 V) и ~115 (~80...138 V)-in the frequency range 50...400 Hz
4. Working with input DC networks: =110 (=66...160 V), =150W (=110...375 V), =230 (=175...342 C), as well as with others - on request.
5. On request, it is possible to perform with an output voltage of up to **400 V**.

AC-DC / DC-DC modules of the **TESAV(H)** series work both in protected sealed compartments and in unprotected ones - in the equipment of flying and stationary objects at low, medium and high altitudes. In all types of ground transport - railway, automobile, tracked. These modules can be used in marine equipment, are very optimal for telecommunications facilities, for supercomputers, radars, as well as for information display screens, etc. They work in conditions with the widest possible temperature range of the environment, wherever a conductive heat sink or forced-air cooling is possible.

In some cases, a convection heat sink is allowed - no additional radiators are required.

TESA series modules have a separate input for supplying AC voltage to the bridge rectifier located inside the module and then, after rectification, to the internal DC-DC converter. To filter the rectified voltage, the TESA series modules have terminals for connecting an external electrolytic or film capacitor. In this case, this power supply module becomes an AC-DC type module with a filter capacitor removed. The advantage of this solution is the possibility of placing the electrolytic capacitor in the "cold" zone of the equipment when the module is operating with a high operating temperature of the housing, significantly higher than the electrolytic capacitor allowed. This technique allows you to increase the operating time for failure, i.e. increase the reliability of the AC-DC power supply. TESA also have a separate input for DC voltage supply, bypassing the bridge rectifier, which increases the efficiency of the module with low-voltage supply networks.

The series of planar AC-DC/DC-DC modules consists of TESAV(H)100, TESAV(H)200, TESAV(H)500 and TESAV(H)1000 modules and is designed for 230W (~100...264 V), 115 (~80...138 V) – in the frequency range of 50...400 Hz or 110 V DC (=66...160 V), 150W (=110...375 V) and 230 (=175...342 In).

Electrical advantages: TESAV(H) series modules contain synchronous rectifiers, which increases their efficiency up to 90-93%. They contain the entire set of service functions, up to parallel operation. Galvanic isolation of output channels in two-channel versions significantly expands the functionality of the construction of equipment with various schemes of connection of output channels. It is possible to use the filter capacitor connection terminals to implement the simplest functions of an uninterruptible power supply, for example, based on lithium batteries.

Design advantages: The TESAV(H) series modules are small in size and have a flat, planar design. This, combined with high efficiency, allows them to realize an energy density from 32 W/in³ to 59 W/in³. The module housings have stiffeners and at the same time serve for conductive heat removal – they are radiators. Considering that all components are structurally connected to the housing and filled with a rigid heat-conducting compound, the resistance to mechanical influences is high.

The table below shows basic parameters of this series.

*** This series replaces the modules of previous generations while maintaining overall connection dimensions.**

Unit type	Maximum power when ordering, W	Dimensions without flanges, mm	Maximal output current, A	Power density, W/In ³	Number of outputs	Input ~115 (~80 - 138 V) transient ~150 V	Input ~230W (~100 - 264 V) without transient	Input =110 (=66 - 160 V) transient =170 V	Input =150W (=110-375 V) transient =450 V	Input =230 (=175-342 V) without transient	Insulation input-output, kV	Trimming	Parallel operation	EMC Standard EN55022 RNS P51318.22 Class A/B MIL-STD-461 CE
TESAV(H)100	50, 100	73x53x13	20	32	1,2	●	●	●	●	●	=1.5	●		External filter
TESAV(H)200	150, 200	95x68x13	30	39	1	●	●	●	●	●	=1.5	●	●	External filter
TESAV(H)500	300, 500	110x84x15	42	59	1	●	●	●	●	●	=1.5	●	●	External filter
TESAV(H)1000	700, 1000	168x110x16	42	55	1	●	●	●	●	●	=1.5	●	●	External filter

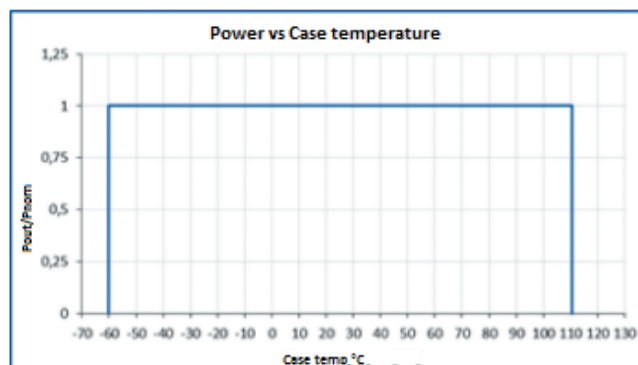
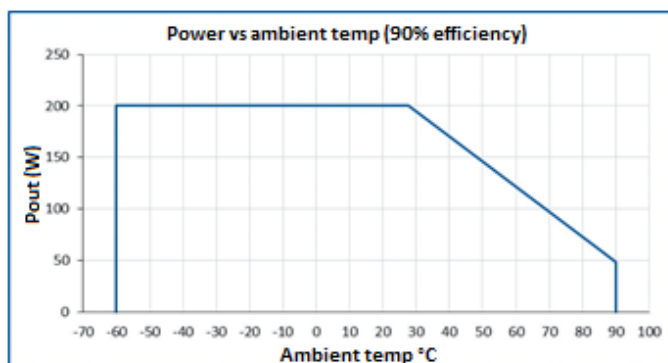
Notes: ● - available, the standard version of the input voltage is highlighted in blue.

Possible cooling methods

These modules work with a conductive heat sink or with the use of forced-air cooling.

In some cases, its own convection heat sink from the module housing is allowed – for TESAV(H)100 and TESAV(H)200.

As an example pls. see the temperature diagram of TESAV200 unit without an additional heat sink with case temperature controlled and maintained under 125°C, as well as output power dependence from ambient temperature with no heat sink. As the ambient temperature rises, the output power needs to be reduced.



JETDF 2.5-20 A Filters for DC/DC modules, short spike limiters, metal cases



JETDF series, interference filters equipped with varistor and suppressor limiters of short spikes coming from the mains, including: JETDF2.5, JETDF5, JETDF10 and JETD20

Nominal current, A	Filter type	Dimensions, mm	Maximum protection pulse current, A	Input 12W (10.2-36) V	Input 24W (18-72) V	Operating case temperature -60...+125 °C	Insulation from case to input/output, `kV	Insertion loss 1 -10 MHz, db
2,5	JETDF2.5	30x20x10	250-1200	●	●	●	=1	55
5	JETDF5	40x30x11	250-1200	●	●	●	=1	55
10	JETDF10	48x33x11	250-1200	●	●	●	=1	55
20	JETDF20	58x40x11	250-1200	●	●	●	=1	55

The JETDF for DC networks are designed for operation in harsh conditions. They protect critical circuits of analog and digital equipment from spike emissions into network and filter interference in input and output circuits of power supply modules and units. High reliability, mechanical strength and resistance to vibrations and shocks, and temperature stability are ensured by the use of electromagnetic components based on amorphous nanocrystalline materials.

For greater effect use these filters in combination with power supplies manufactured by AEPS-group.

JETAF 1-20 A filters for AC/DC modules, short spike limiters, metal cases



JETAF series, interference filters with varistor and suppressor limiters of short spikes coming from the mains, including: JETAF1, JETAF5, JETAF10, JETAF20 and JETAF15-400

Nominal current , A	Filter type	Dimensions, mm	Maximum protection pulse current, A	Input ~3F 400 (83-138), V	Input ~115 (83-138), V	Input ~230 (182-264) V	Input ~230W (100-264) V	Operating case temperature -40...+85 °C	Insulation from case to input/output, kV	Insertion loss 1 -10 mHz, db
1	JETAF1	58x40x11	1200		•	•	•	•	~1,5	55
5	JETAF5	101x51x20	1200		•	•	•	•	~1,5	55
10	JETAF10	111x61x24	1200		•	•	•	•	~1,5	55
20	JETAF20	134x84x28	1200		•	•	•	•	~1,5	55
15	JETAF15-400	134x84x28	4500	•	•	•	•	•	~1,5	55

The JETAF series for AC networks designed for operation in harsh conditions. They protect critical circuits of analog and digital equipment from spike emissions into network and filter interference in input and output circuits of power supply modules and units. High reliability, mechanical strength and resistance to vibrations and shocks, and temperature stability are ensured by the use of electromagnetic components based on amorphous nanocrystalline materials.

For greater effect use these filters in combination with power supplies manufactured by AEPS-group.

Dear consumers of products made by AEPS-Group!

Our team is sure that you have highly qualified personnel skilled in the field of power supplies, you have a good understanding of the internal design of modular secondary power supply units and are optimistic about our innovative solutions with the desire to move forward. We have vast experience in researching your typical mistakes caused by traditional approaches to the newest products. As the company's founder and General Designer I will try to tell you about the most "effective" mistakes.

1. You should understand that heat, in its thermodynamic sense, is the most destructive thing for a modular PSU, due to direct influence of temperature on reliability. The most important thing that we and you should aim for is to

"spread" the heat concentrators as much as possible on the heat-removing surface of a PSU, i.e. its "foot"! Miniaturization required by **you** for the equipment is a process focused on reducing and thinning of everything that is possible. As a result, the heat-dissipating foot in our constructions has a thickness locally reaching 0.4 mm in the thinnest places of the foot in low-power PSUs and 0.8-1.5 mm in high-power PSUs. If you turn on the power supply without a heat-dissipating plate or heat sink, you can get the temperature of high-power components (transistors, diodes, suppressors, microcircuits) reaching 150°C - 200°C within 10 seconds! If you manage to turn it off quickly, it does not mean that fate will forgive you for another attempt like this. Warning: a plastic fan will not help you here even if you put a cardboard tube on it for better efficiency.

RECOMMENDATION: follow the datasheet carefully, do not turn on the PSU on an office desk without a heat-dissipating plate imitating your future heat sink.

2. If you have a heat sink, then you are in for the following frequent mistakes:

- a) the heat sink surface has non-flatness of more than 0.1 mm for a linear distance up to 100 mm, and more than 0.2 mm for a distance up to 200-300 mm;
- b) you use a heat-conducting paste with a rate of less than 3.0 W/mK;
- c) you applied the paste without using a mesh stencil with 2x2...4x4 mm square paste sections and the distance between squares 0.5-1 mm, which ensures the removal of excess air and the minimum paste layer thickness when tightening the power supply unit to the heat sink;
- d) finally, you just forgot to remove the advertising label from the foot! If you need to turn on the unit for a short period of time, for example for the purpose of acceptance testing, pls. use a **copper plate with a thickness of 4-8 mm as a temporary heat sink**. The width and length of this plate should not be less than these dimensions of the power supply unit itself, with the thickness 4 mm or more. Of course, it is necessary to use a thin heat-conducting mat (avoid sponge type mats!).

3. **Do not solder wires** to pin terminals of the PSU! All PSUs with pin terminals are only designed to be mounted on a printed circuit boards! When soldering a wire, a large diameter wire in particular, and when operating the unit under conditions of shock and vibration, and even during installation, the unit's pin is used as a console that transmits the force to the printed circuit board inside the unit, both during soldering and long-term operation. And in combination with heating the micro-displacements cause forces splitting thin layers of ceramics on ceramic chip capacitors located inside the PSU. **Explosions and burnouts of printed circuit boards in these zones are inevitable.** A filling compound, even a hard type, does not help here, and may add troubles on thermal cycles.

RECOMMENDATION: if you have difficulties in designing a printed circuit board section for PSU, we will do it for you for free. The best approach for electrical connections of PSU pins in the equipment is to **use printed circuit boards with at least four layers of foil 100-400 microns thick**. You can order such printed circuit boards from us. You can also entrust us with the preliminary design and modeling of the cooling system for our power supplies.

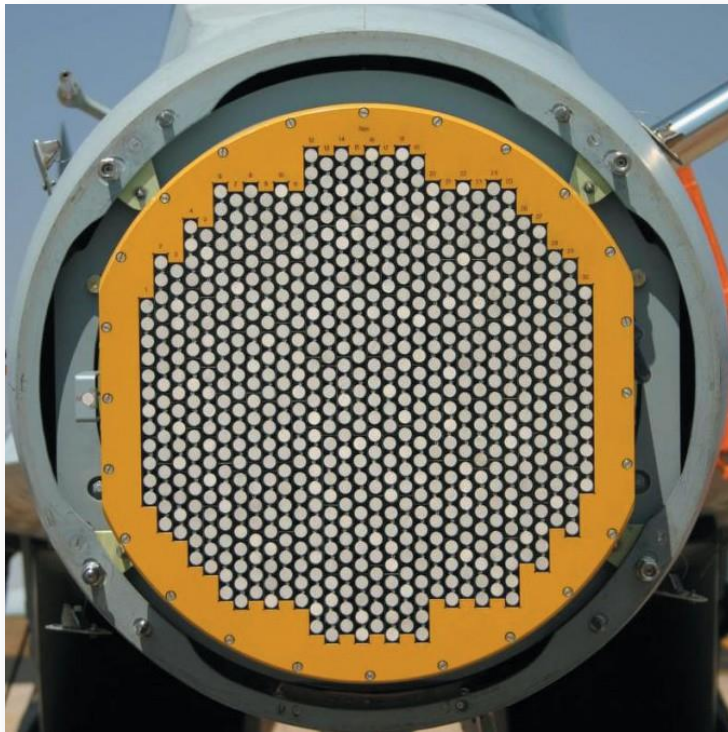
4. We recommend:

- a) use an oscilloscope (OSC) measuring cable with a "closed" input and with a central core of higher resistance, for example 50 Ohms;
- b) the cable must be loaded to resistance equal to wave (50 Ohms), normally placed in a shielded volume of the input OSC connector;
- c) a resistor with value equal to the characteristic impedance of the cable and coupling capacitor (non-ceramic) should be connected in the shielded volume in series with the cable core from the unit's output side;
- d) take measurements only with the all external components connected as recommended by the datasheet
- e) **do not measure ripple if the length of the bare unshielded part of the cable (facing the output of the unit) is over 2.5-4 mm, and the connection point of the unit's measuring cable is closer 2-5 cm from the unit's case.**

All of the above is quite difficult to implement, but otherwise instead of measuring the true PSU ripple, you will get the artifacts in the OSC cable caused by resonances of cable and connection circuit; the error can be dozens of times higher than the true value! In our opinion, for these purposes it is better to use a special OCS with differential input and at a least special cables for measuring ripple of switching power supplies only.

AEPS-group team.

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