

## Advantages

- Made in Russia (as part of the import substitution program)\*
- Export deliveries are possible
- Output power up to 500 W, 59 W/inch<sup>3</sup>
- A series of ultra-low profile modules for use with additional external elements and work with variable/or constant input voltages
- Maximum operating temperature of the housing from -60 °C to +110 °C (on request)
- Efficiency up to 93 %
- 110x84x15 (mm) aluminum housing with mounting flanges (dimensions are specified without flanges)
- Input voltage options: For TESAV (with an external filter capacitor):  
 ~115 (~80...138 V) range 50...400 Hz  
 ~230 (~176...264 V)  
 For TESH:  
 =110 (=66...160 V)  
 =150W (=110...375 V)  
 =230 (=175...342 V)
- Output voltage adjustment
- Remote ON
- Remote feedback
- Parallel operation

\* Under a License agreement with AEPS-group



## Description

TESAV(TESH)500-F7 isolated ultra-low-profile dual-input AC-DC/DC modules for operation in harsh operating conditions.

The modules are designed for use with additional external elements and work with variable/or constant input voltages.

Output power up to **500 W** is available at a power density of **59 W/inch<sup>3</sup>**, the maximum operating temperature of the housing is up to **-60°C...+110°C**. The modules have a full range of protection and service functions, including remote on/off and output voltage adjustment. The optimal combination of technical parameters and competitive price makes it possible to use these modules in a variety of areas – at low altitude, in all types of transport, in supercomputers, in high-temperature areas, in screens of information display systems, in radars, etc. - wherever low profile, small size and weight, high efficiency are important.

## TESAV / TESH, when ordering, the power can be selected from a range of 300 and 500 W

Single channel 500 W Model	Input voltage**	Pout max.	Nominal output voltage***	Output current max .	Typical efficiency
TESAV 500 - 230 S12-F7-xU	For TESAV ~115 (~80...138 V) ~230 (~176...264 V)  For TESH =230 (=175...342 V) =150W (=110...375 V)	500 W	12 V	41.7 A	90 %
TESAV 500 - 230 S15-F7-xU		500 W	15 V	33.3 A	91 %
TESAV 500 - 230 S24-F7-xU		500 W	24 V	20.8 A	92 %
TESAV 500 - 230 S27-F7-xU		500 W	27 V	18.5 A	92 %
TESAV 500 - 230 S36-F7-xU		500 W	36 V	13.9 A	93 %
TESAV 500 - 230 S48-F7-xU		500 W	48 V	10.4 A	93 %
TESAV 500 - 230 S60-F7-xU		500 W	60 V	8.3 A	93 %

Temperature version (index instead of X): -40...+110°C (S), -60...+110°C (M)

\*\* Modules with a different input voltage range can be supplied on request.

\*\*\* Modules with non-standard output voltage are available on request

## Ordering information

### TESAV 500 - 230WS24 - F7 - MU / TESH 500 - 150WS24 - F7 - MU

1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8

- 1 «TESAV»/«TESH» Series
- 2 Nominal output power, W
- 3 Index of nominal input voltage:
  - For **TESAV** (with an external filter capacitor):
    - ~**115** (~80...138 V) range 50...400 Hz
    - ~**230** (~176...264 V)
  - For **TESH**:
    - =**110** (=66...160 V)
    - =**150W** (=110...375 V)
    - =**230** (=175...342 V)
- 4 Index of the number of output channels:
  - S** one
- 5 Nominal output voltage, V (two characters on channel)
- 6 Case size
- 7 Index of the operating temperature range of the housing:
  - S** -40°C...+110°C
  - M** -60°C...+110°C
- 8 Index of constructive execution:
  - U** reinforced housing with flanges

## General specifications

Switching frequency		150 kHz typ. PWM
Temperature range	Operating case temp.	-40° C... +110° C (Standard "S")
	Storage	-60° C... +130° C
Overheat protection		+115° C typ.
Cooling	conductive through radiator	
Humidity		5-95 % rel. H
Insulation	IN/case	~1500 V
	IN/OUT	~3000 V
	OUT/case	~500 V
	OUT/OUT	=500 V
Insulation resistance @ =500 B		>20 MOhm
Thermal, schock,mechanical shock & vibration		MIL-STD-810F
Safety standards		IEC/EN 60950-1
Typical MTBF	Pout = 0,7 Pout max	50 000 hrs (Tcase = 50 °C)
Weight (max)		403 g

## Input specifications

The frequency of the input power supply	50 Hz (up to 400 Hz on request) AC or DC	
AC power ranges for TESAV, when applied to terminals L, N	"230" (~176-264 V), "115" (~80-140 V)	
DC power ranges for TESAV, when applied to +IN, -IN terminals	"230" (=175-372 V), "115" (=82-198 V)	
DC power ranges for TESH	"115" (=82-198 V), "150W" (=110-375 V), "230" (=175-342 V)	
EMC Standards *	With external filter CE MIL-STD-461F, CE EN 55022 - class A/B	
Power factor		<i>H.U.</i>

## Output specifications

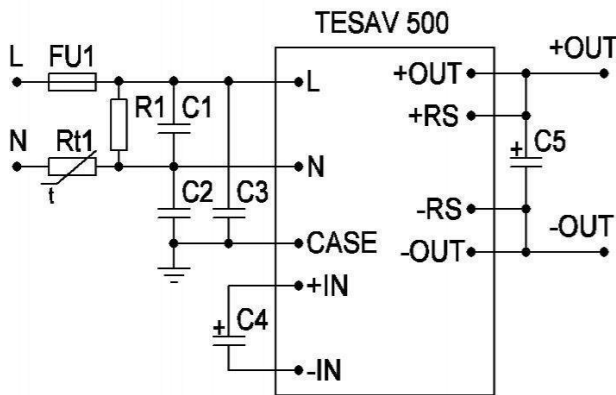
Output voltage adjustment	in the range $\pm 5\%$ , input ADJ (see drawing)	
Instability of the output voltage**	when changing from $U_{in,min}$ to $U_{in,max}$	$\pm 0.5\%$ (for load 10-100 %)
	when changing the load from 10% to 100 %	$\pm 2\%$
Ripple and noise (peak-to-peak)	20 MHz range	<2 % (for load 10-100 %)
Protection	Overload	autoreset at a load of 110-150 % of $I_{out,nom}$
	Overvoltage	<130 % $U_{out,nom}$
Maximal capacity (max)	24 V model (50% load) - typ. 32 000 $\mu F$	
Remote OFF	by connecting the "-IN" and "ON" pins or applying 0-0.5 VDC to the "ON" pin	

See the description of filters on the website [www.te-power.ru](http://www.te-power.ru) .

\*\* When the load changes in the main stabilized channel from 10% to 100%, the voltage instability of the second channel can reach  $\pm 13\%$  .  
If necessary, contact us by e-mail [russia@te-power.ru](mailto:russia@te-power.ru) .

All characteristics are given for NCU,  $U_{out,nom}$ .,  $I_{out,nom}$ ., unless otherwise specified

## Typical connection scheme (minimum required)



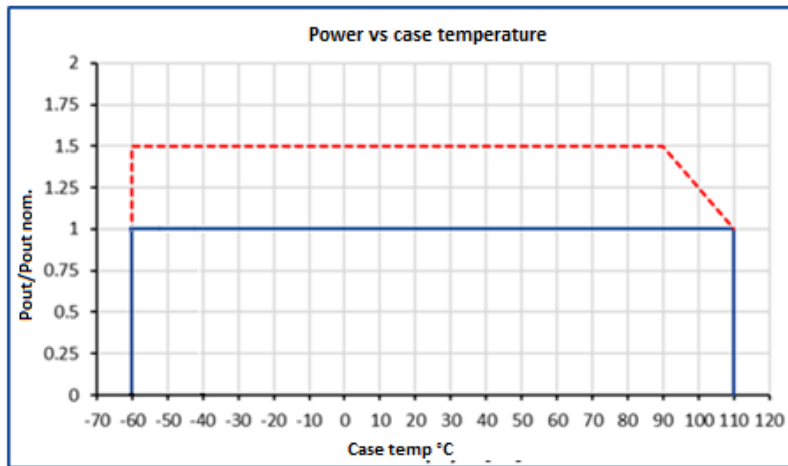
For range "230", AC 50 Hz or DC

for TESAV	
C1	0.47 uF 275VAC, X2 class
C2, C3	2200 pF 250VAC, Y2 class
R1	470 kOhm 0.5 W
Rt1	NTC 4 Ω 3 A
FU1	12 A 250 V
for TESAV / TESH	
C4	470 uF 400 V for NCU and 100% load
C5	Tantalum, Low ESR

The design of the modules allows their use only when installed on a printed circuit board. It is mandatory to use the elements of the typical scheme shown in the figure.

For C5 ratings - see 5.6 in the Technical Guidance Materials for AC/DC modules.

## Max output power based on case temperature



—— Standard maximum power output based on case temperature.

- - - Possible range of output power for customized product.

Before use, the advertising label must be removed from the front surface of the module housing.

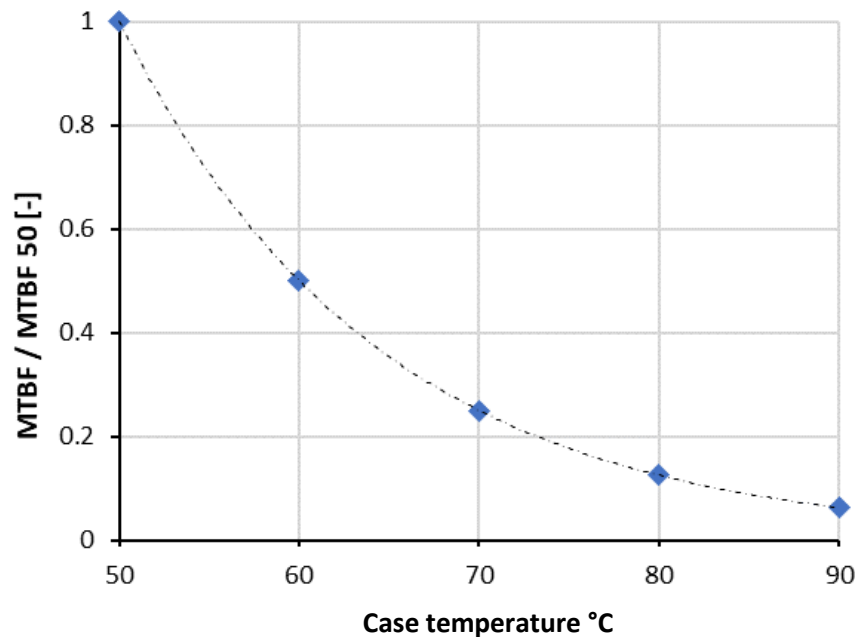
When using a module with a radiator, for a high-quality fit to the radiator, it is necessary to use a heat-conducting paste with a layer thickness of no more than 0.1 mm and a thermal conductivity coefficient of at least  $2.0 \text{ W} / (\text{m} \cdot \text{K})$ , applied using a mesh stencil with the formation of square sections of paste after its application (for example, 2x2 mm - 4x4 mm and a distance between squares of 0.5-1 mm). This allows you to ensure the output of excess air and the minimum thickness of the paste layer when the module is attracted to the radiator.

### **Note:**

The modules have protection against short-term short circuit at the output, this mode is emergency, not for permanent working use. It is forbidden to turn on the modules when the output pins are short-circuited.

## MTBF based on case temperature

When using the unit, a customer must in one way or another monitor maximal heatsink temperature. Maximal heatsink temperature near the center point of the longer unit's side (considered as unit case temperature) must correspond to the expected unit's MTBF. Approximate MTBF function shown on the graph lower, where MTBF / MTBF 50 is unit's MTBF value at chosen unit's case operating temperature relative to value at 50°C unit's case temperature.



## Activation of thermal protection

When the internal thermal protection of the module is triggered (type. +110 °C ... +120 °C), the module turns off (until automatic restart). Such a condition in the equipment should lead to measures of forced cooling of the radiator of the module, for example, the inclusion of fans. In case of prolonged use of this mode (especially in cases of operation close to idling), the module may fail due to frequent shutdowns at the maximum temperature of the module radiator, the time before the automatic restart when the thermal protection is triggered can last from several seconds to several minutes, depending on the thermal inertia of the radiator.

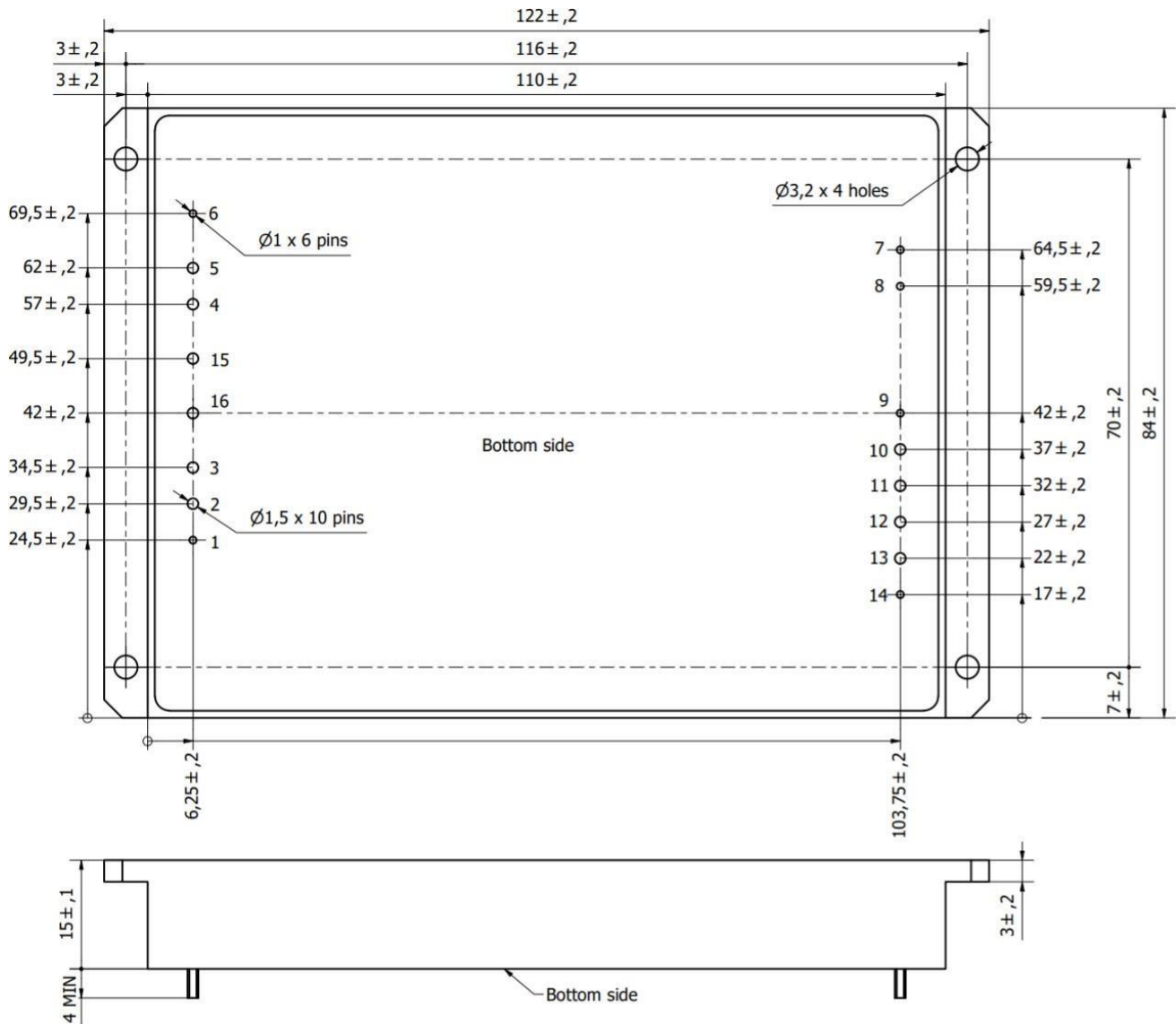
If necessary contact us by e-mail [www.te-power.ru](http://www.te-power.ru).

## Dimensions

1	2,3	4,5	6	7	8	9	10,11	12,13	14	15	16
ON	-IN	+IN	CASE	PAR	ADJ	-RS	-OUT	+OUT	+RS	*L	*N

\* not for TESH

Dimensions in millimeters, 4 mounting holes, installation only on a printed circuit board



## Additional information

When ordering these products, the consumer is fully responsible for using the products in strict accordance with the rules and operating principles given in this product data sheet and technical guidance materials (RTM) provided on the manufacturer's website.

Please note that the information in this document is not complete. More detailed information (additional requirements, typical switching schemes, operating rules, etc.) is provided on the website [www.te-power.ru](http://www.te-power.ru) . All images are for illustration purposes only, the actual appearance of the product may vary, including the type and placement of internal components and the placement of connectors.

In accordance with the company's policy in connection with the continuous improvement of the design of products, the manufacturer reserves the right to change the content of specifications and promotional materials without prior notice! Make sure you are using the latest documentation, which can be downloaded at [www.te-power.ru](http://www.te-power.ru) .

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