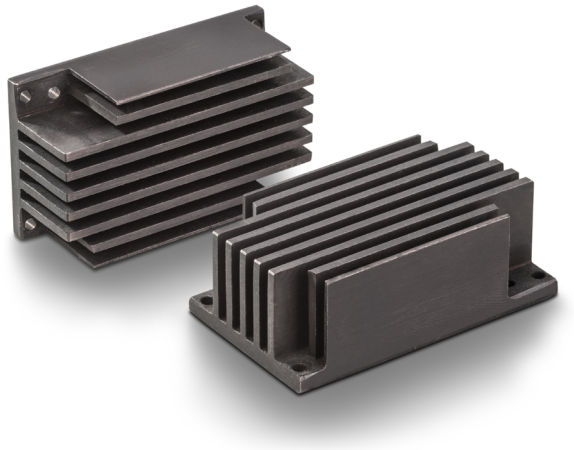
voltbricks

DATASHEET

VO Series

Heatsinks

For VDR, VDV and VDV(HV) series of DC-DC converters



1. Description

VO series - aluminum finned heatsinks were designed to provide power supply units with proper thermal conditions due to the most efficient area of heat dissipating surface.

We use duralumin to receive the best heat-transfer coefficient and minimal unit weight. Heatsink has an anodic oxide coating - to prevent corrosion. Also this type of coating provides heatsink with flat black color. As a result, emissivity increases up to 0,88-0,9, as well as heatsink's thermal absorption/emission.

There are two types of heatsinks: with longitudinal and cross ribs. Ribs configuration must match with air flow direction inside of equipment.

1.1. Additional information

1.1.1. Description on the manufacturer's website

https://support.voltbricks.com/datasheets/VO-en.pdf

1.1.2. Sales department

+65 6950 0011

sales@voltbricks.com

1.1.3. Technical support

support@voltbricks.com

2. Features

- Duralumin material (AD31)
- Emissivity up to 0.88–0.9 (protective coating - anodic oxidation)
- Longitudinal and cross ribs
- Compatible with VDR, VDV and VDV(HV) series

3. Content

4. Heatsink selection guideline

The need to use a heatsink in combination with power supply unit can be determined by the following parameters: converter's efficiency a certain mode — η, thermal impedance - $R_{CASE.MED.}$, maximum case temperature - T_{MAX}, ambient temperature - T_{AMB}.

At first, you need to determine the maximum possible power, that can be dissipated by converter without heatsink:

$R_{DISS.\ MAX}$

$$P_{DISS.\ MAX} = (T_{MAX} - T_{AMB}) / R_{CASE.\ MED.}, [W]$$

Then calculate power of heat losses in the specified modes - please use efficiency diagram specified in converter's datasheet:

$$P_{DISS.} = (P_{OUT} / \eta) - P_{OUT}, [W]$$

In case $R_{DISS.} \leqslant R_{DISS.\ MAX}$ the surface area of converter is enough for heat dissipation. But, please note, units with power more than 60 W require a heat distribution base installation, to prevent local overheating.

In case $R_{DISS.} \geqslant P_{DISS.\ MAX}$, it is necessary to use a heatsink. Heatsink's surface area approximate minimum can be calculated using the formula:

$$S = (20 \times 35 \times P_{DISS.}) / (T_{MAX} - T_{AMB.}), [cm^2]$$

This ratio was calculated experimentally and based on the thermal resistance of aluminum to air, and has been confirmed through a series of tests. This ratio is a simplified heat-transfer coefficient in the «surface-heatsink-ambient» system.

VO heatsinks surface area is given in the tables before the related heatsinks. If the heatsink's minimum required area under the given conditions is less than VI heatsink area, then this heatsink is permissible to use under your operating conditions.

4.1. Heat dissipation improvement recommendations

1. It is important to ensure unhindered convection for converter and to take into account possible interactions with other heat sources in an enclosed space (inside of system's case).
2. It is important to pay attention to the contact area and flatness between converter and heatsink.
3. 3. It is necessary to ensure the most tight fit of heatsink to converter's surface.
4. 4. Thermal paste must be applied in an even layer of minimum thickness. While applying the paste or a thermally conductive insulating pad, the additional thermal resistance can be estimated by the following formula:

$$R_R = \delta_R / (\lambda \times S_R), [°C/W]$$

where δ_R is the thickness of the pad or paste layer, m;

λ — heat conduction coefficient (indicated in reference materials), W / (m × K);

S_R — insulating pad or paste layer contact area, m^2.

5. Forced convection (for example, by fan) allows to reduce the heat-dissipating system size, or even omit it. Airflow with 1 m/s speed through the heat dissipating surface of converter or its heatsink will reduce thermal resistance by about half. Therefore heat removal effective area will be doubled versus natural convection. The thermal resistance can be decreased in the most effective way by the airflow speed increase from 0.5 to 1.5 m/s. Further airflow speed increase starts an airflow separation from heatsink surface, and, as a result, the thermal resistance remains almost constant.

5. Product line

5.1. Heatsinks and converters compatibility

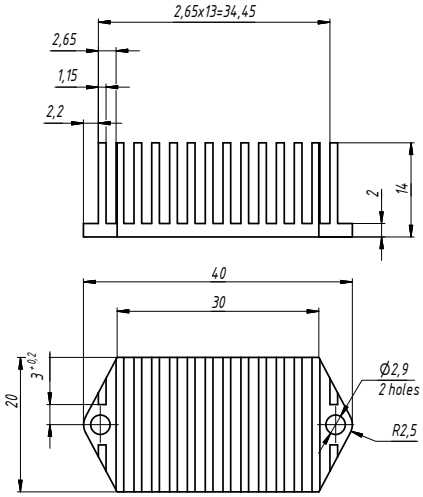
Type of heatsink	Series of DC-DC converters		Details
	VDV VDV(HV)	VDR	
I	VDV3 VDV5 VDV6 VDV8	VDR15 VDR25	Page 4
II	VDV10 VDV12	VDR40 VDR50	Page 4
III	VDV15 VDV20 VDV25	VDR75 VDR100	Page 5
IV	VDV30 VDV40 VDV50	VDR120 VDR160	Page 6
V	VDV60 VDV80 VDV(HV)30 VDV(HV)40	VDR250 VDR300	Page 7
VI	VDV120 VDV160 VDV80 VDV(HV)120 VDV(HV)160	VDR400 VDR500	Page 8
VII	VDV320 VDV400 VDV500 VDV(HV)320 VDV(HV)400 VDV(HV)500	–	Page 9
VIII	VDV1000 VDV(HV)1000	–	Page 10

5.2. Type I

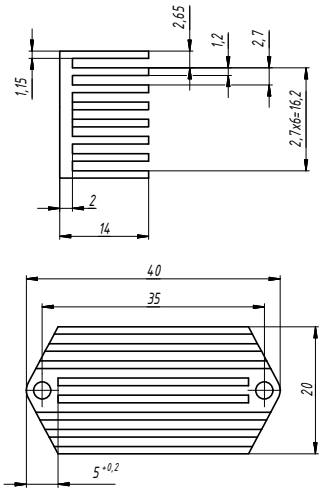
5.2.1. Heatsink parameters

Part number	Ribs configuration	Dimensions A×B×H×D, mm	Area, cm²	Weight, g	Picture, №
752694.001	Cross	40×20×14×2	74	14	*[Pic. 1]*
752694.002	Longitudinal	40×20×14×2	74	14	*[Pic. 2]*

5.2.2. Drawings



Pic. 1. 752694.001.



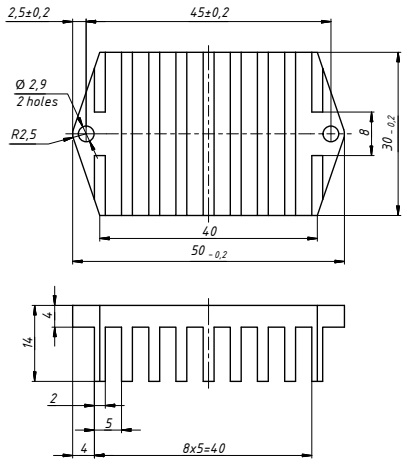
Pic. 2. 752694.002.

5.3. Type II

5.3.1. Heatsink parameters

Part number	Ribs configuration	Dimensions A×B×H×D, mm	Area, cm²	Weight, g	Picture, №
752695.001	Cross	50×30×14×4	74	29	*[Pic. 3]*

5.3.2. Drawings



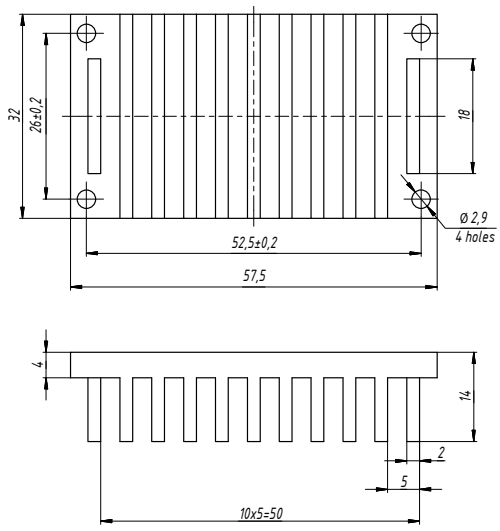
Pic. 3. 752695.001.

5.4. Type III

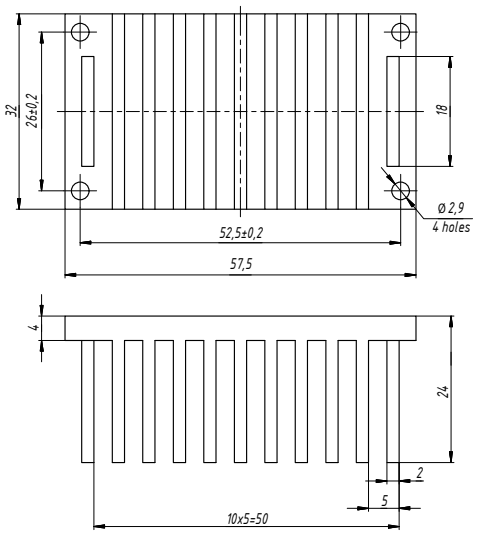
5.4.1. Heatsink parameters

Part number	Ribs configuration	Dimensions A×B×H×D, mm	Area, cm²	Weight, g	Picture, №
752695.002	Cross	57,5×32×14×4	94	38	*[Pic. 4]*
752695.003	Longitudinal	57,5×32×14×4	97	39	*[Pic. 5]*
752695.002-01	Cross	57,5×32×24×4	163	55	*[Pic. 6]*
752695.003-01	Longitudinal	57,5×32×24×4	170	58	*[Pic. 7]*

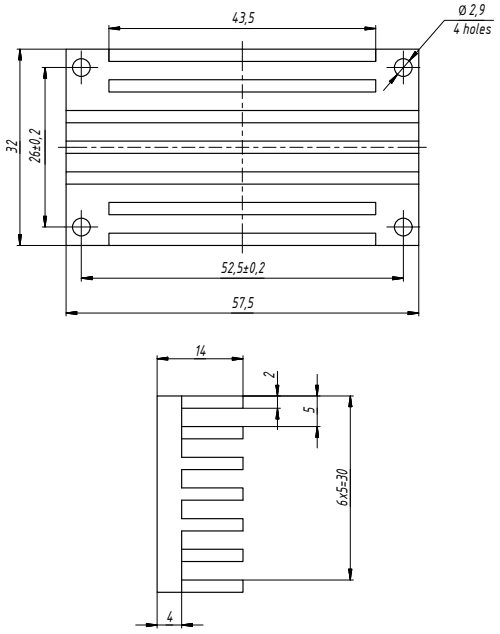
5.4.2. Drawings



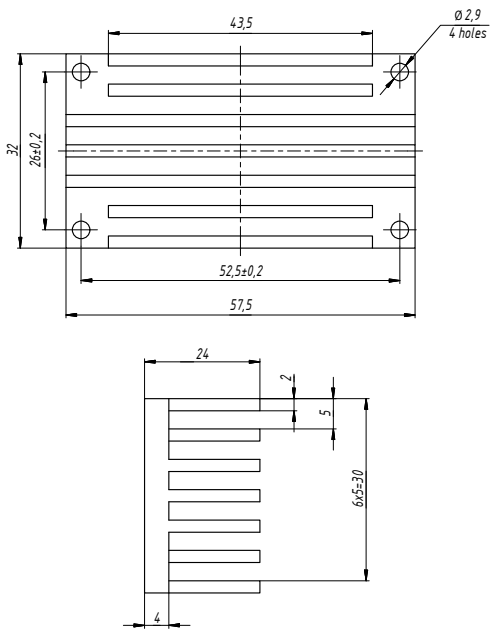
Pic. 4. 752695.002.



Pic. 6. 752695.002-01.



Pic. 5. 752695.003.



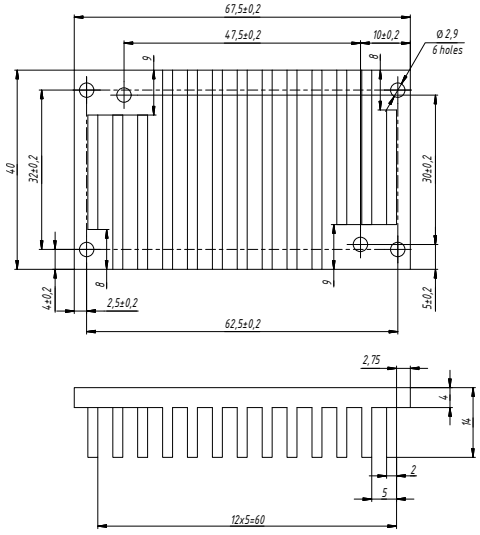
Pic. 7. 752695.003-01.

5.5. Type IV

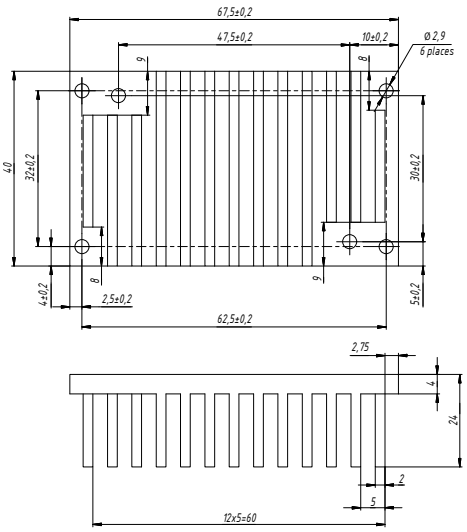
5.5.1. Heatsink parameter

Part number	Ribs configuration	Dimensions A×B×H×D, mm	Area, cm²	Weight, g	Picture, №
752695.004	Cross	67,5×40×14×4	130	54	*[Pic. 8]*
752695.005	Longitudinal	67,5×40×14×4	143	55	*[Pic. 9]*
752695.004-01	Cross	67,5×40×24×4	224	77	*[Pic. 10]*
752695.005-01	Longitudinal	67,5×40×24×4	251	81	*[Pic. 11]*

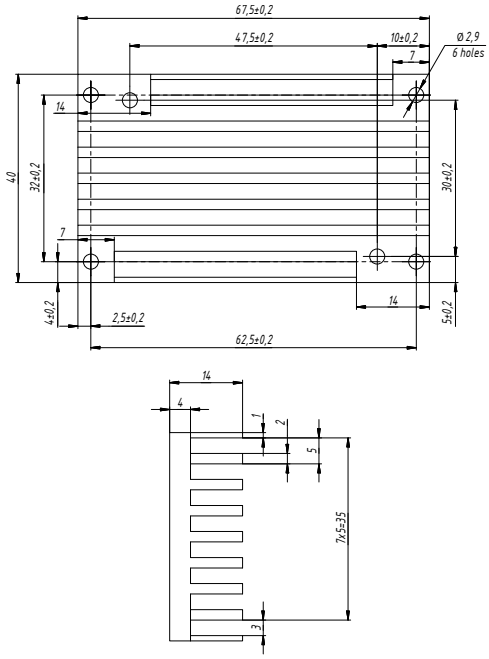
5.5.2. Drawings



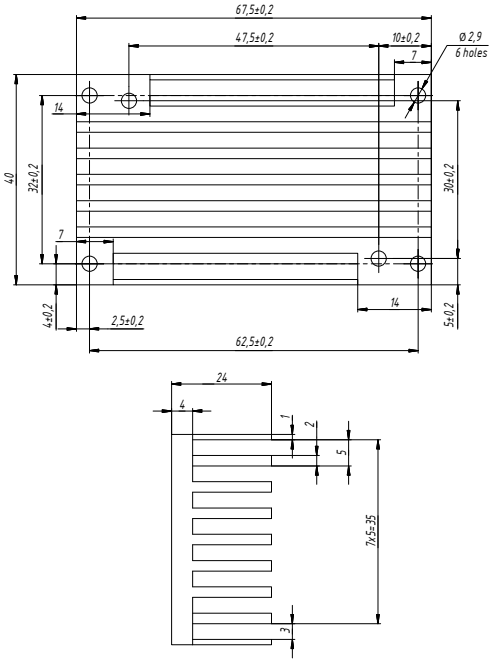
Pic. 8. 752695.004.



Pic. 10. 752695.004-01.



Pic. 9. 752695.005.



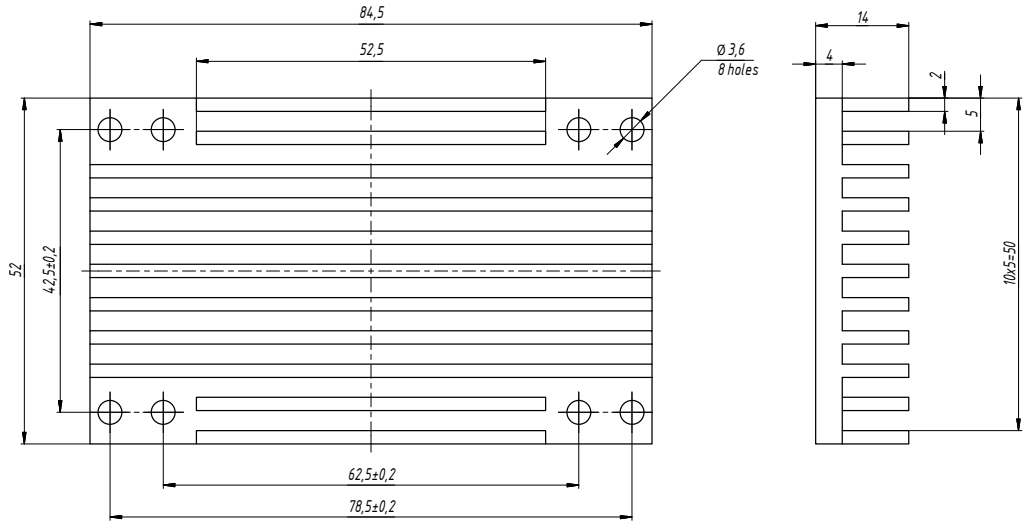
Pic. 11. 752695.005-01.

5.6. Type V

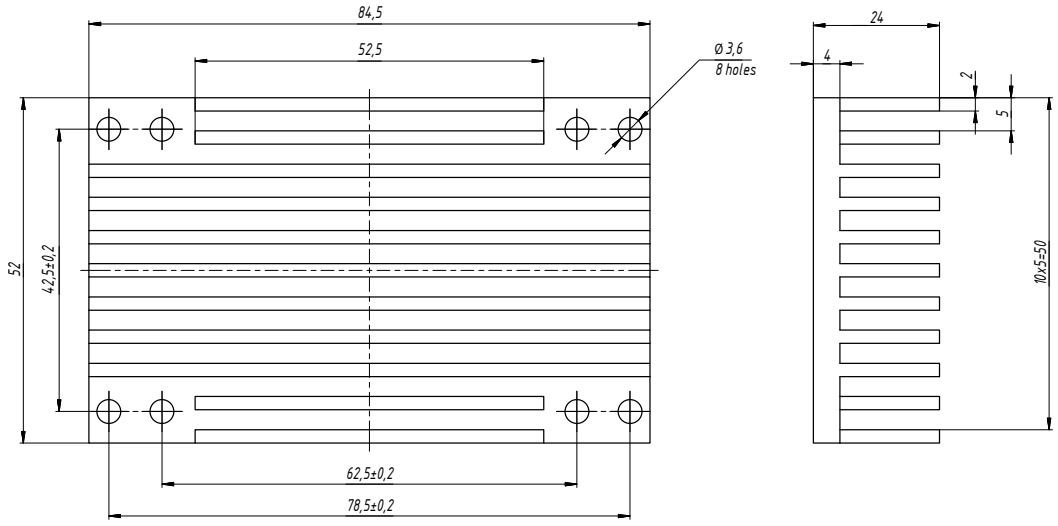
5.6.1. Heatsink parameter

Part number	Ribs configuration	Dimensions A×B×H×D, mm	Area, cm²	Weight, g	Picture, №
752695.006	Longitudinal	84,5×52×14×4	218	90	*[Pic. 12]*
752695.006-01	Longitudinal	84,5×52×24×4	383	135	*[Pic. 13]*

5.6.2. Drawings



Pic. 12. 752695.006.



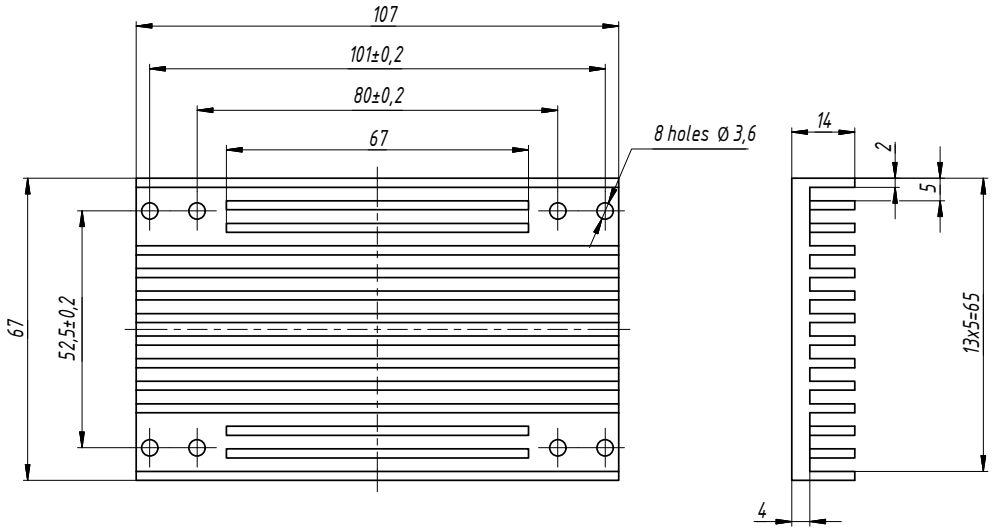
Pic. 13. 752695.006-01.

5.7. Type VI

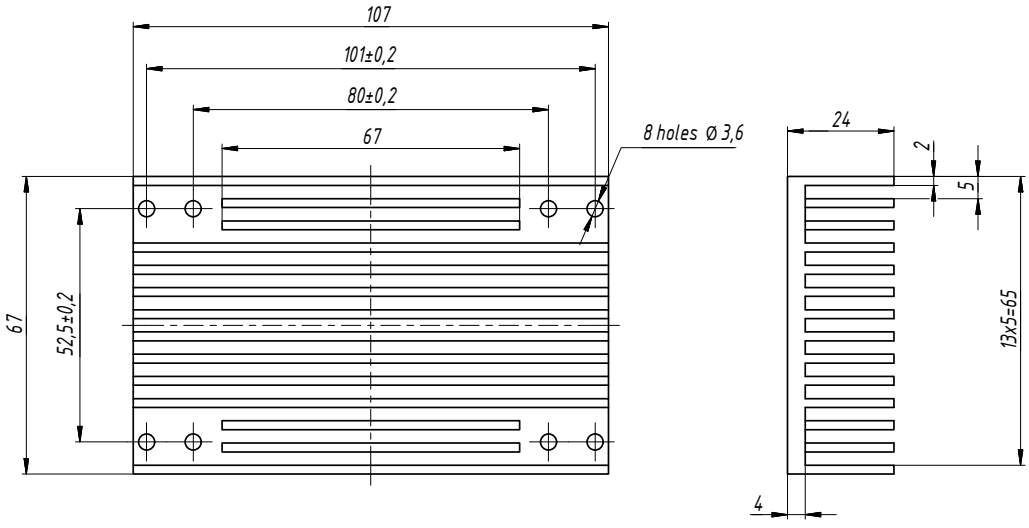
5.7.1. Heatsink parameters

Part number	Ribs configuration	Dimensions A×B×H×D, mm	Area, cm²	Weight, g	Picture, №
752695.007	Longitudinal	107×67×14×4	358	150	*[Pic. 14]*
752695.007-01	Longitudinal	107×67×24×4	631	222	*[Pic. 15]*

5.7.2. Drawings



Pic. 14. 752695.007.



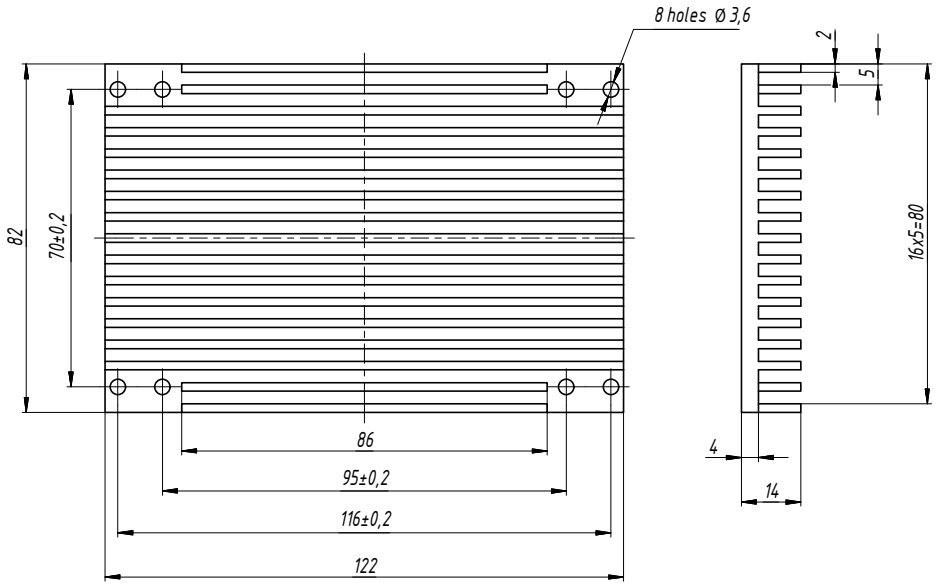
Pic. 15. 752695.007-01.

5.8. Type VII

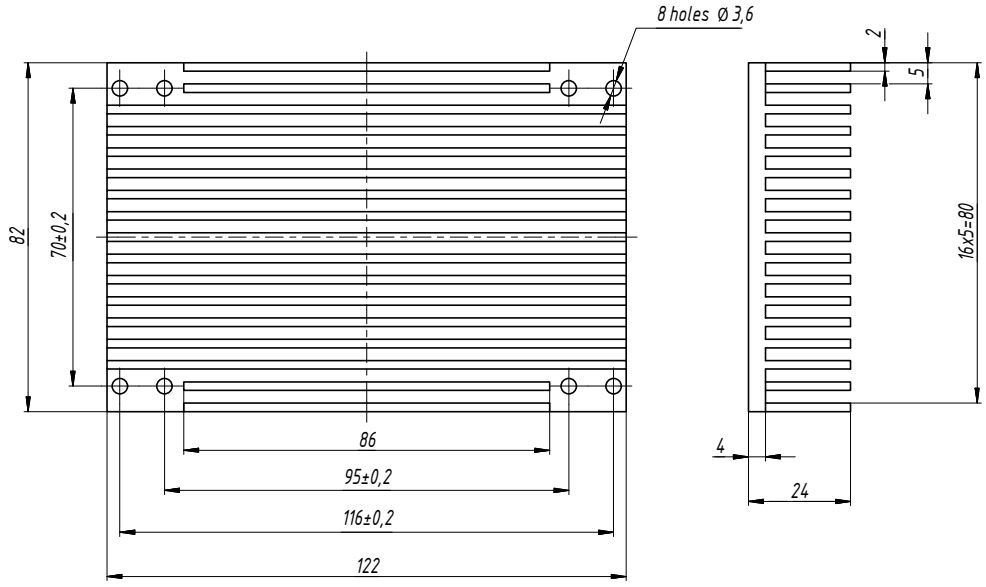
5.8.1. Heatsink parameters

Part number	Ribs configuration	Dimensions A×B×H×D, mm	Area, cm²	Weight, g	Picture, №
752695.008	Longitudinal	122×82×14×4	558	210	*[Pic. 16]*
752695.008-01	Longitudinal	122×82×24×4	901	317	*[Pic. 17]*

5.8.2. Drawings



Pic. 16. 752695.008.



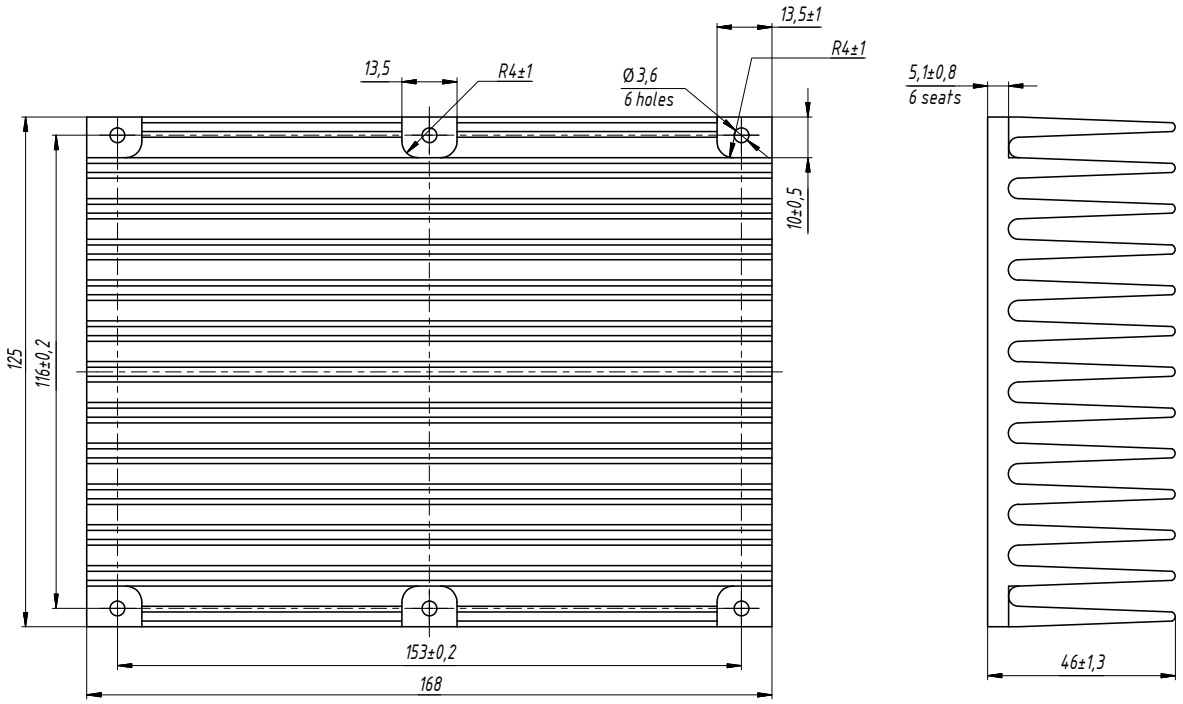
Pic. 17. 752695.008-01.

5.9. Type VIII

5.9.1. Heatsink parameters

Part number	Ribs configuration	Dimensions A×B×H×D, mm	Area, cm²	Weight, g	Picture, №
752695.009	Longitudinal	168×125×46×6	1890	1200	*[Pic. 18]*

5.9.2. Drawings



Pic. 18. 752695.009.

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