

COLD PLATES

2021

the WEBRA Aluminum Cold Plate Solution



WEBRA INDUSTRI offers high performance friction stir welded aluminum cold plates suited for demanding power semiconductor needs.

WEBRA customizes solutions in terms of thermo- and fluid dynamics and the power module configuration.

WEBRA uses friction stir welding (FSW) technique, which gives safe and economic production of cold plate units. The FSW technique benefits from homogeneous joints without any added materials. FSW joints are more resistant to corrosion and stress due to the homogeneity of the material.

WEBRA gives full support in thermal management: calculation, design, production and bench testing of the end product.

WEBRA feels that joining a project at an early stage is the key to a successful thermal system. A close co-operation gives the end result a higher rate of effectiveness, great economy and altogether an optimal solution for the customer. Our design team is always ready to support and give in-put in any matters of thermal management.

For high-quality thermal management that suits your needs – choose **WEBRA**.

WEBRA Cold Plates for Power Semiconductors.

WEBRA Cold Plates for IGBT modules:

Aluminum water cold plates for IGBT modules 140x190, 130x140, Infineon PrimePACK2 and PP3, EconoDual3, Semikron SKiiP3 and 4, SKiM63 and 93, Semipack2, Fuji Electric High Power 6-Pack, Mitsubishi/Powerex Mega Power Dual IGBT and others are available in standard configurations. Thermal- and fluid dynamic behaviour may be tailored to your set of IGBT modules.

WEBRA Cold Plates for press-pack discs.

A uniform pressure distribution is vital for press pack discs. The **WEBRA** solution for FSW cold plate press-packs offer a robust construction, perfectly flat surfaces for ideal contact and outstanding performance.

WEBRA press pack cold plates are suitable for 4", 5" and 6" discs.

Different options for disc centering and tools for replacement are available.

Water - glycol cooler	Suitable for semiconductor components	Weight kg	Flow rate, pressure drop ¹	Heat source	Rth K/kw/Comp (ref.temp) ³	Page
Water - glycol cooler for press pack discs						
PVK - 146 - 137 - 26	3" or 4" discs (1x)	1,4	6 l/min, 100 kPa	Ø 85	5,1 (n.s)	7
PVK - 150 - 150 - 25	5" or 6" discs (1x)	1,5	24 l/min, 600 kPa	Ø 125	3,5 (n.s)	8
PVK - 350 - 150 - 25	5" or 6" discs (2x)	2,8	24 l/min, 600 kPa	Ø 125	5,0 (n.s)	9
Water - glycol cooler for IGBT modules						
VK- 210 - 170 - 18	Universal cooler for (2x) EconPIM™ ³ or (EconoPACK2 (2x) + EasyPACK2 (2x)	1,8	4 l/min, 40 kPa	62 x 122 (2x)	< 55 (inlet)	10
VK- 280 - 185 - 21	140 x 190 (1x)	2,9	5 l/min, 50 kPa	140 x 190	< 55 (inlet)	11
VK- 280 - 215 - 24	62 mm housing (3x)	3,9	10 l/min, 90 kPa	60 x 105 (3x)	16,4 (n.s)	12
VK- 290 - 170 - 18	(2x) PrimePack3 (89 x 250) or (2x) PrimePack (89 x 172)	11,6	80 l/min			13
VK - 300 - 280 - 10						14
VK - 300 - 280 - 20	EconoPACK™ ³ (6x)	4,5	16 l/min, 27 - 32 kPa	62 x 125 (6x)	16 - 20 (n.s)	15
VK - 305 - 300 - 26	62 mm housing (8x)	3,2	6 l/min, 100 kPa	60 x 105 (8x)	< 43 (inlet)	16
VK - 350 - 330 - 16	70 mm diode module (6x)	5,0	12 l/min, 50 kPa	70 x 105 (6x)	< 50 (inlet)	17
VK - 360 - 215 - 18	Semikron SKiiP4 (4x)	3,8	12 l/min, 50 kPa	180 x 250	6 (inlet)	18
VK - 360 - 215 - 26	Semikron SKiiP3 (8x double sided)	5,4	25 l/min, 100 kPa	62 x 122 (8x)	n.s	19
VK - 370 - 230 - 28	62 mm housing (6x)	6,4	50 l/min oil, 200 kPa	60 x 105 (6x)	< 50 (n.s)	20
VK - 370 - 300 - 22	Infineon PrimePACK3 (3x)	5,4	7 l/min, 50 kPa	89 x 250 (3x)	< 15 (inlet)	21
VK - 390 - 215 - 18	Semikron SKiiP3 (4x)	4,1	12 l/min, 45 kPa	130 x 280	5,3 (inlet)	22
VK - 400 - 265 - 33	Universal cooler SKiM63 or SKiM93	9,4	50 l/min, 200 kPa	120 x 160	< 17 (inlet)	23
VK - 400 - 350 - 10						24
VK - 420 - 135 - 30	Drill pattern 38 x 80 (12x)	4,6	8 l/min, 10 kPa	50 x 92	40 (average)	25
VK - 430 - 150 - 20	Infineon EconoPACK™ ³ (6x)	3,5	16 l/min, 50 - 70 kPa	62 x 125 (6x)	< 18 (inlet)	26
VK - 430 - 150 - 22	140 x 190 (2x)	3,8	10 l/min, 40 kPa	140 x 190 (2x)	3,2 (outlet)	27
VK - 440 - 200 - 18	Infineon PrimePACK2 (3x)	4,3	10 l/min, n.s	89 x 172 (3x)	n.s	28
VK - 450 - 290 - 26	140 x 190 (4x)	9,3	16 l/min, 25 kPa	140 x 190 (4x)	11,5 (outlet)	29
VK - 480 - 394 - 22	140 x 190 (4x) + 130 x 140 (1x) + comp	11,4	8 - 15 l/min, 70 - 200 kPa	140 x 190 (4x)	3 - 6 (n.s)	30
VK - 498 - 460 - 24	140 x 190 (4x) + 130 x 140 (1x)	14,8	20 l/min, 140 kPa	140 x 190 (4x)	5 (n.s)	31
VK - 530 - 380 - 50	Infineon PrimePACK3 (4x)	11,5	20 l/min, 30 - 70 kPa	90 x 270 (4x)	6,2 - 9,8 (outlet)	32
VK - 540 - 150 - 12	Mitsubishi 150 x 166 (3x)	3,6	20 l/min, 50 kPa	150 x 166	< 5 (n.s)	33
VK - 550 - 180 - 20	Universal cooler for Mitsubishi 150 x 166 or PP2 (6x, double sided)	5,3	16 l/min, 50 kPa	89 x 172 (3x, 6x)	13,8/ 20,2 (inlet)	34
VK - 560 - 222 - 27	140 x 190 (2x)	9	6 - 18 l/min, 30 - 160 kPa	140 x 190 (2x)	3 (n.s)	35
VK - 600 - 400 - 28	140 x 190 (8x double sided)	17	30 l/min, n.s	140 x 190 (8x)	< 10 (inlet)	36
VK - 620 - 320 - 42	PrimePACK3 (6x)	11	20 l/min, 100 - 130 kPa	89 x 250 (6x)	6-9 (average)	37
VK - 640 - 570 - 23	140 x 190 (6x)	22,6	30l/min, 60 kPa	140 x 190 (6x)	< 10 (inlet)	38
VK - L - (200/400) - 20	122 x 162, EconoPACK™ (multiple)	X	20 l/min, 110 kPa	140 x 190	5,2 (average)	39
VK - L - 200 - 20	Universal 140 x 190 or 150 x 166	X	20 l/min, 100 kPa	140 x 190	< 5 (average)	40
VK - L - 260 - 18	Infineon PrimePACK2 (multiple)	X	25 l/min, 65 kPa	89 x 172	9,2 (average)	41
VK - L - 400 - 18	Universal cooler for 130 x 140, 140 x 190, 150 x 166, 62 mm, PP2 and PP3	19,4/m	30 l/min, 50 - 100 kPa	140 x 190	< 5 (n.s)	42
VK - L - 400 - 18	Universal cooler for 130 x 140, 140 x 190, 150 x 166, 62 mm, PP2 and PP3	X	30 l/min, 100 kPa	140 x 190	< 7 (n.s)	43
VK - L - 534 - 56	130 x 140 (multiple)	X	30 l/min, 80 kPa	130 x 140	7,7 (n.s)	44

Cold Plate selection by semiconductor component

Semiconductor component	Drill pattern	Available cold plate	Number of components
62 mm housing	48 x 93	VK - 280 - 215 - 24	3x
		VK - 305 - 300 - 26	8x
		VK - 370 - 230 - 28	6x
		VK - L - 440 - 18	Custom
EconoPACK™3	50 x 110	VK - 300 - 280 - 20	6x
		VK - 430 - 150 - 20	6x
EconoPACK™ +, 122 x 162	110 x (50 x 3)	VK - L - (200/400) - 20	Custom
PrimePACK2 89 x 172	73 x (29 x 4)	VK - 440 - 200 - 18	3x
		VK - L - 260 - 18	Custom
		VK - 550 - 180 - 20	6x
PrimePACK3 89 x 250	73 x (39 x 6)	VK - L - 400 - 18	Custom
		VK - 369 - 299 - 22	3x
		VK - 530 - 380 - 50	4x
PrimePACK3 89 x 250	73 x (39 x 6)	VK - 620 - 320 - 42	6x
		VK - L - 400 - 18	Custom
		VK - 360 - 215 - 26	8x
SKiiP3	Special	VK - 390 - 215 - 18	4x
		VK - 360 - 215 - 18	4x
SKiiP4	Special	VK - 360 - 215 - 18	4x
SKiiM63 120 x 160	101 x (50 x 3)	VK - 400 - 265 - 33	2x
SKiiM93 150 x 160	137 x (50 x 3)	VK - 400 - 265 - 33	2x
130 x 140	124 x (57 x 2)	VK - L - 534 - 56	Custom
		VK - L - 400 - 18	Custom
140 x 190	124 x (57 x 3)	VK - 280 - 215 - 24	1x
		VK - 430 - 150 - 22	2x
		VK - 480 - 394 - 22	4x
		VK - 500 - 460 - 24	4x
		VK - 560 - 222 - 27	2x
		VK - 600 - 400 - 28	8x
		VK - 640 - 570 - 23	6x
		VK - L - 200 - 20	Custom
		VK - L - 400 - 18	Custom
		VK - L - 400 - 18	Custom
Mitsubishi 150 x 166 (contact area 150 x 129,5)	137,5 x (38 -42,5-38)	VK - 540 - 150 - 12	4x
		VK - 550 - 180 - 20	6x
		VK - L - 200 - 20	Custom
		VK - L - 400 - 18	Custom

EasyPACK, EconoPIM, EconoPACK and PrimePACK are trademarks of Infineon Technologies

SKiiP and SKiM are trademarks of Semikron

$R_{th_{h-w}} / \text{Comp (inlet)}$ = (T max, cooler - T fluid, inlet) / P (Comp)

$R_{th_{h-w}} / \text{Comp (average)}$ = (T max, cooler - (T fluid, inlet + T fluid, outlet)/2) / P Comp

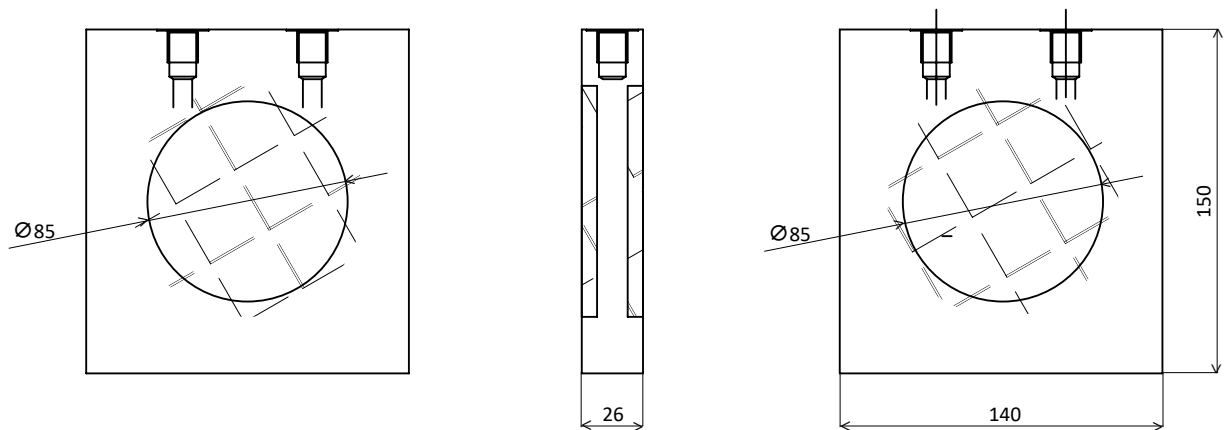
$R_{th_{h-w}} / \text{Comp (outlet)}$ = (T max, cooler - T fluid, outlet) / P (Comp)

SPECIFICATION

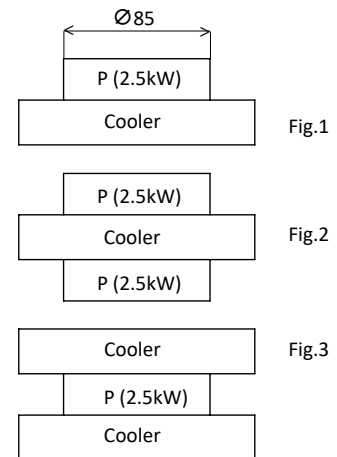
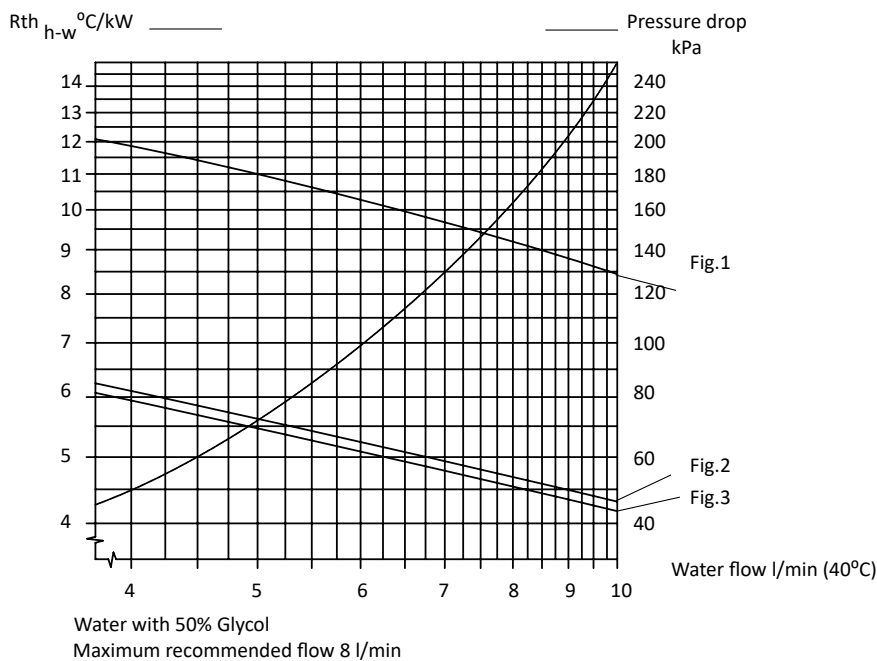
¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (¹)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
3" or 4" press pack discs (1x)	Water-Glycol 50-50%	6 l/min, 100kPa	Ø 85	5,1 (n.s)	1,4 kg

DIMENSIONS



PERFORMANCE

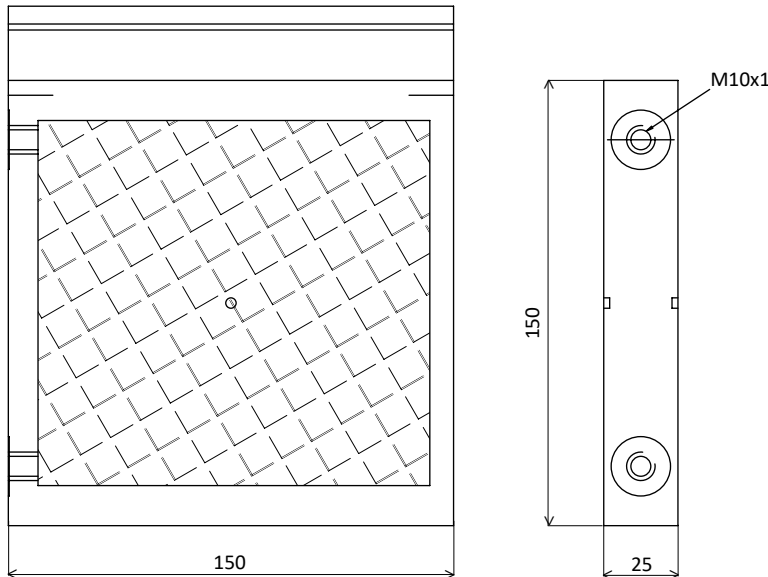


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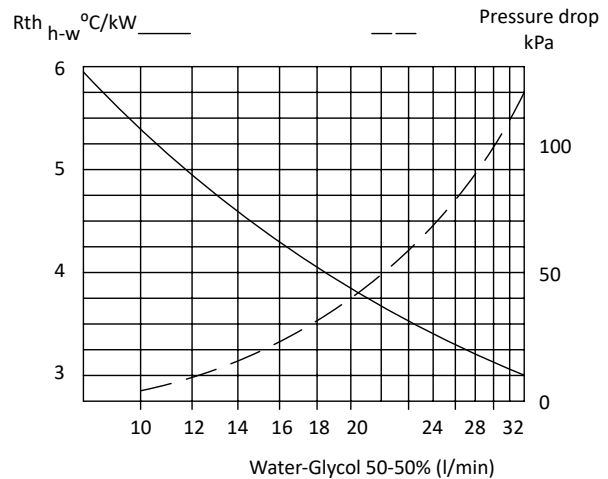
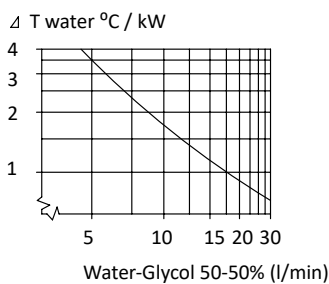
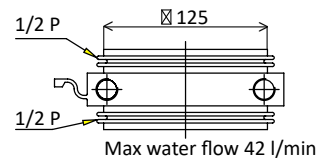
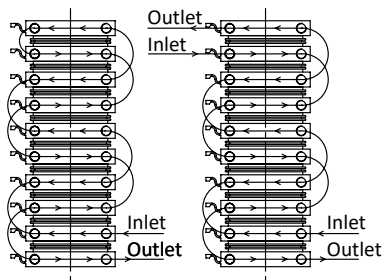
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Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
5" or 6" press pack discs (1x)	Water-glycol 50-50%	24 l/m, 600 kPa	Ø 125	3,5 (outlet)	1,5 kg

DIMENSIONS



PERFORMANCE

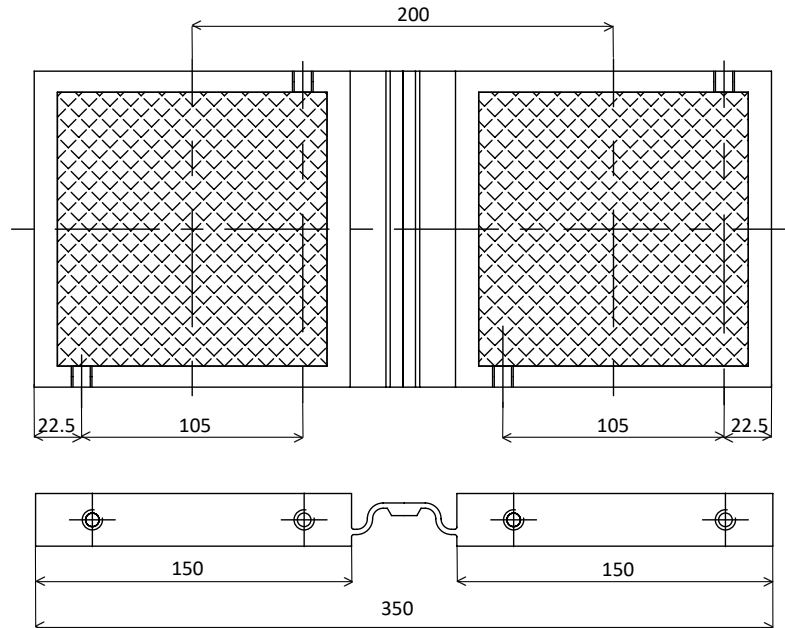


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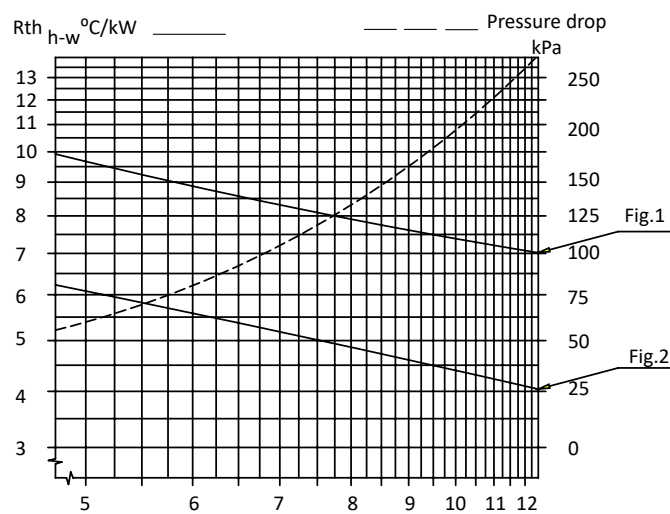
Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
5" or 6" press pack discs (2x)	Water-glycol 50-50%	7,5 l/min, 118kPa	Ø 125	5,0 (inlet)	2,8 kg

DIMENSIONS



PERFORMANCE

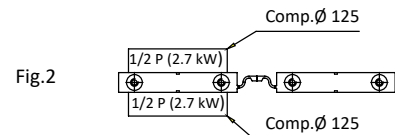
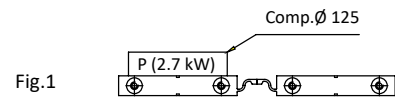
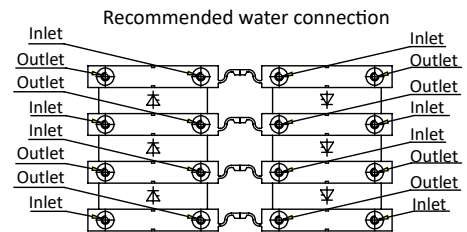
Rth between average temp. of cooler and inlet temp. of water.



Inlet water with 50 °C
 Water with 50% Glycol

Water flow l/min

Recommended water flow
 4-6 l/min for each unit.
 Max water flow 8.5 l/min
 and unit.



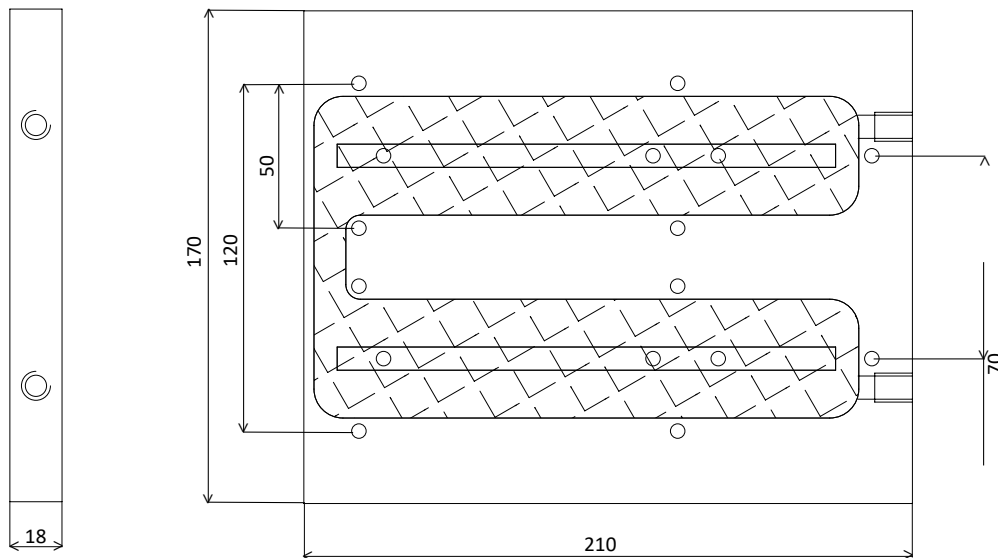
SPECIFICATION

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² uniform heat sources ³ Rth at conditions as in (¹)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Universal cooler for (2x) EconoPIM™ ₃ (drill pattern 50 x 110) or (2x) EconoPACK2 (drill pattern 93) + (2x) EasyPACK (drill pattern 53)	Water-Glyco 50-50%	4 l/min, 40 kPa	62 x 122 (2x)	< 55 K/kW (inlet)	1.8 kg

DIMENSIONS



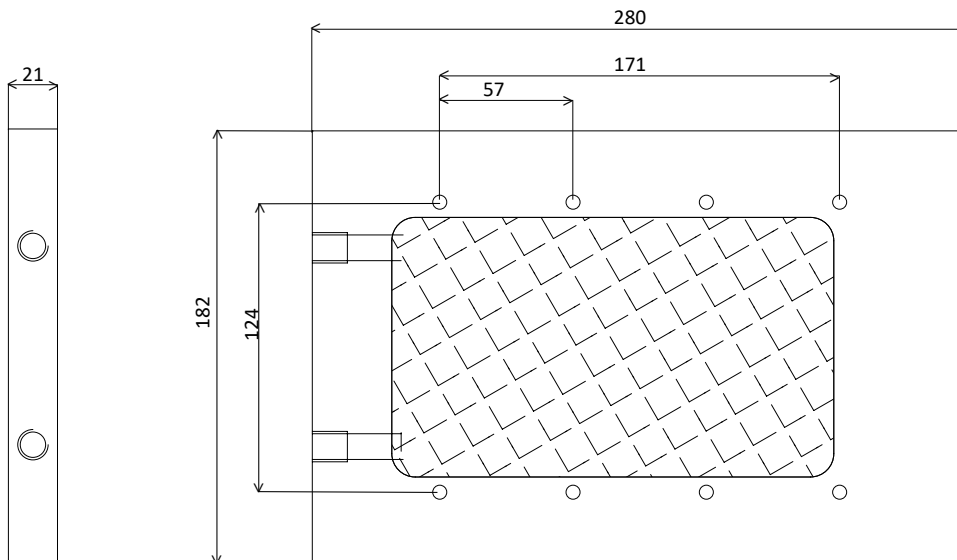
PERFORMANCE

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Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
140 x 190 (1X)	Water-Glycol 50-50%	5 l/min, 50 kPa	140 x 190	< 6.3 K/kW (inlet)	2.9 kg

DIMENSIONS



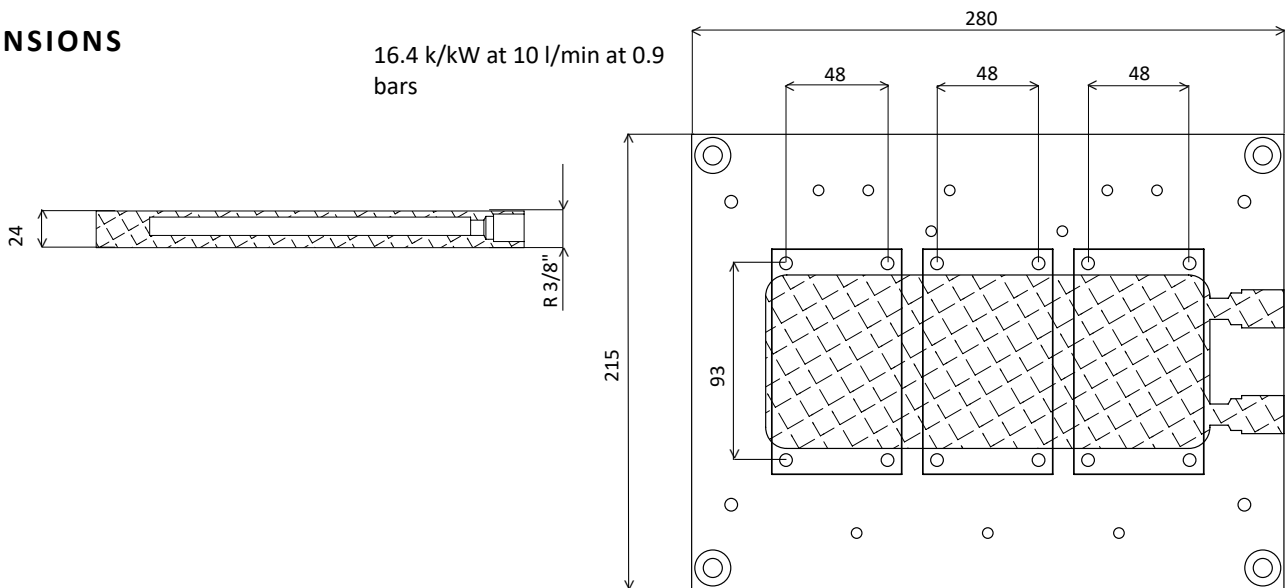
PERFORMANCE

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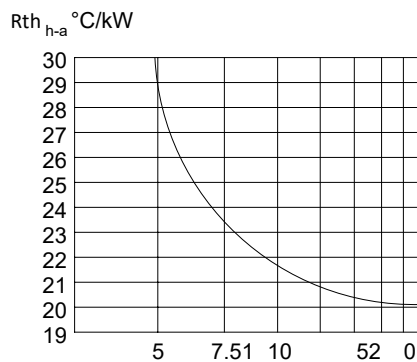
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Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
(3x) modules 62 mm housing	Water-Glycol 50-50%	10 l/min, 90 kPa	60 x 105 (3x)	16.4 (n.s)	3.9 kg

DIMENSIONS



PERFORMANCE



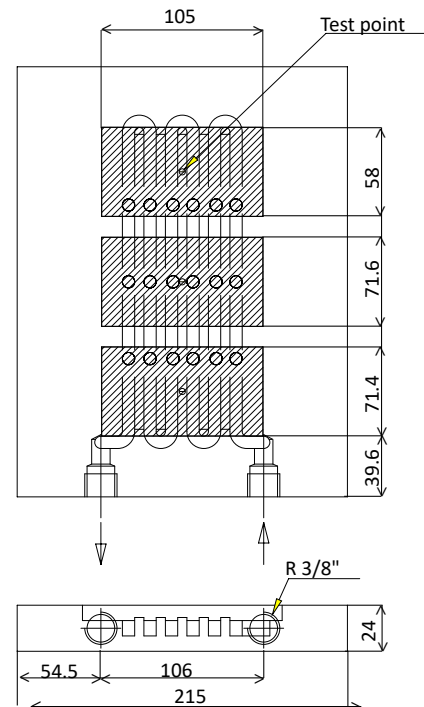
Rth / Component

Water (measured)

Flow 5 l/min Pressure drop 0.1 bar	Rth _{h-a} 28.8 °C/kW
Flow 10 l/min Pressure drop 0.4 bar	Rth _{h-a} 21.7 °C/kW
Flow 15 l/min Pressure drop 0.8 bar	Rth _{h-a} 20.5 °C/kW
Flow 20 l/min Pressure drop 1.2 bar	Rth _{h-a} 20.1 °C/kW

Water-Glycol 50-50% (calculated)

Flow 5 l/min Pressure drop 0.1 bar	Rth _{h-a} 40.3 °C/kW
Flow 10 l/min Pressure drop 0.5 bar	Rth _{h-a} 30.4 °C/kW
Flow 15 l/min Pressure drop 0.9 bar	Rth _{h-a} 28.7 °C/kW
Flow 20 l/min Pressure drop 1.4 bar	Rth _{h-a} 28.1 °C/kW

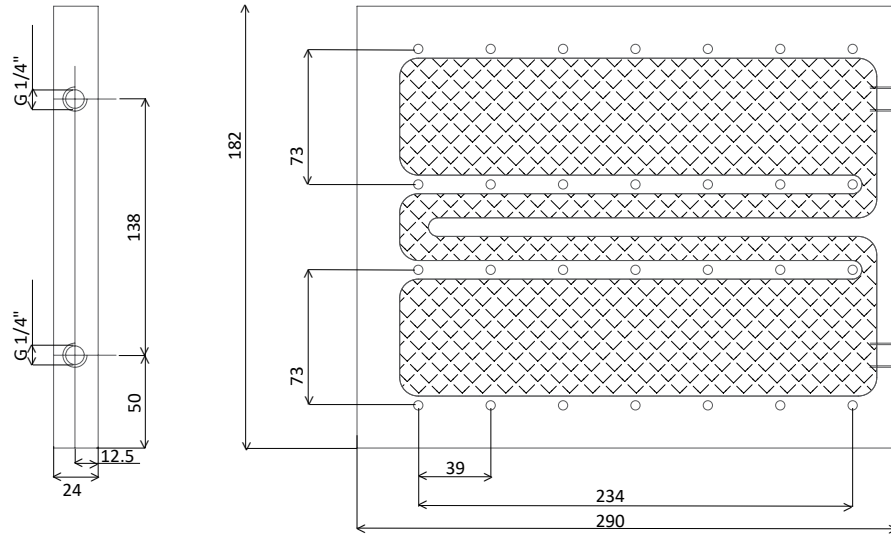


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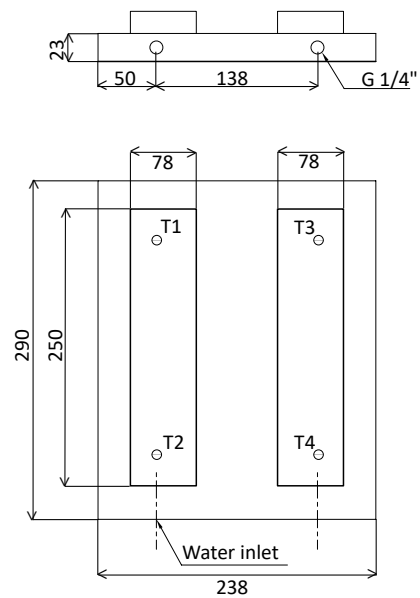
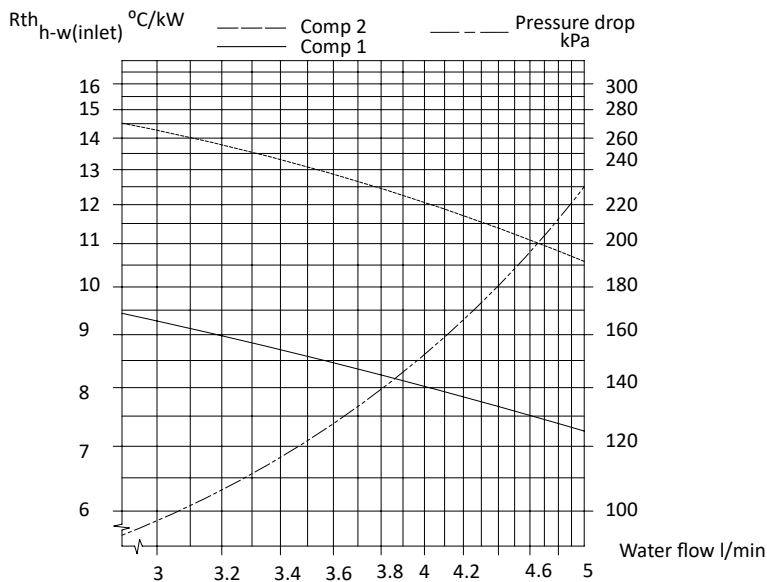
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² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
(2x) PrimePack3 (89 x 250) or (2x) PrimePack (89 x 172)	Water-Glycol 50-50%	8,0 l/min			

DIMENSIONS



PERFORMANCE



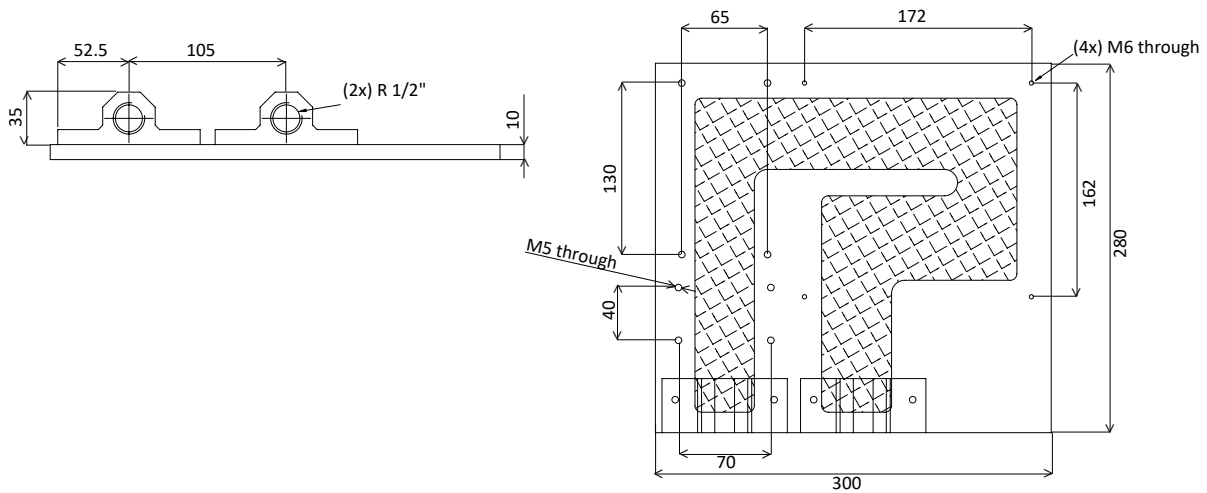
T1 - T2 < 1°C/kW
T3 - T4 < 1°C/kW

SPECIFICATION

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Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight

DIMENSIONS



PERFORMANCE

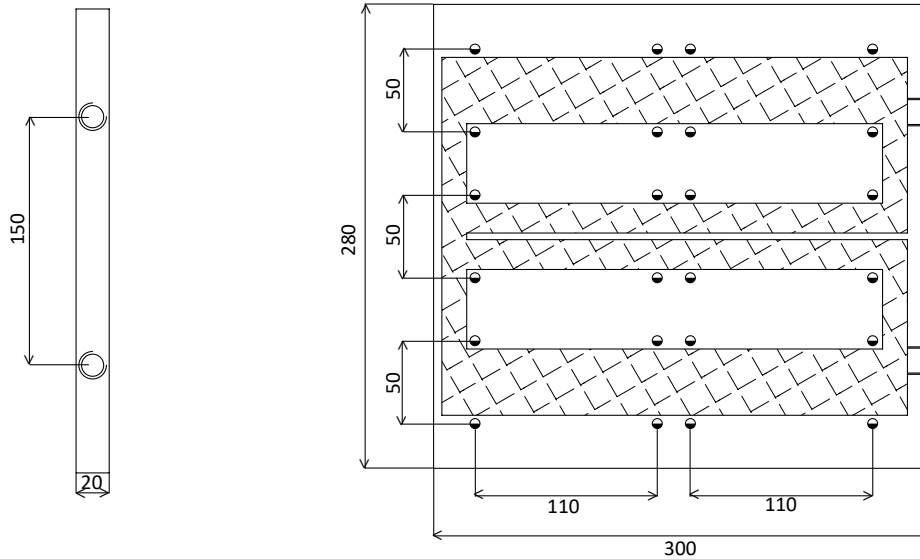
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Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
EconoPACK™3 (6x)	Water-Glycol 50-50%	16 l/min at 27-32 kPa	62 x 125 (6x)	16-20 (n.s)	4,5 kg

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PERFORMANCE

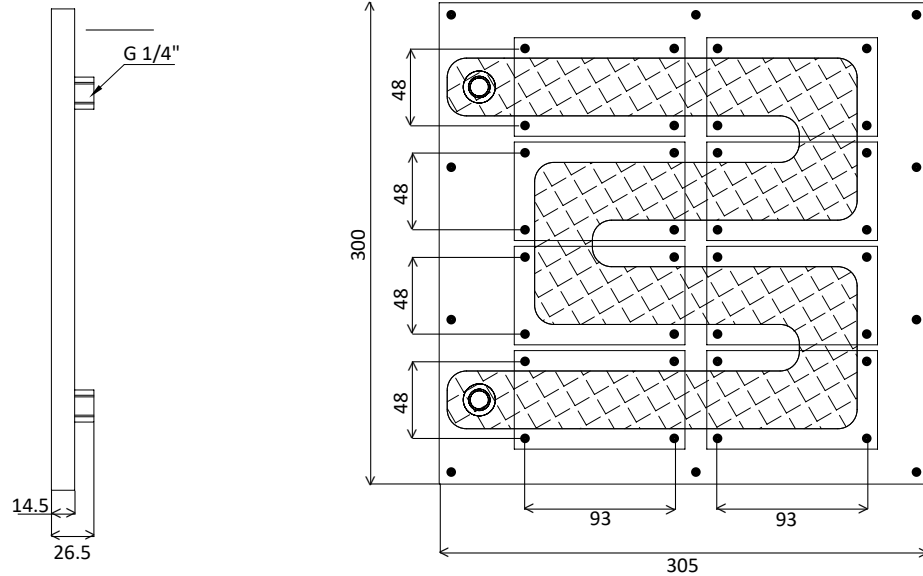
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Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
62 mm housing (8x)	Water-Glycol 50-50%	6 l/min at 100 kPa	60 x 105 (8x)	< 43 (inlet)	3,2 kg

DIMENSIONS



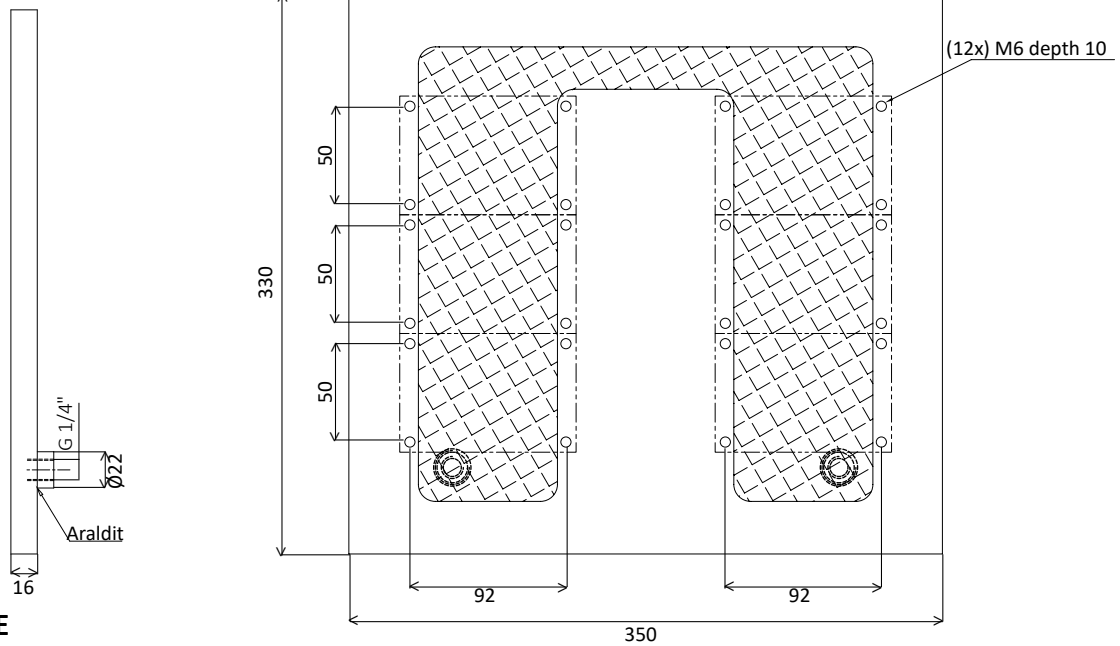
PERFORMANCE

SPECIFICATION

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Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
70 mm diode module (6x) Drill pattern 58 x 92	Water-Glycol 50-50%	12 l/min at 50 kPa	70 x 105 (6x)	< 50 (inlet)	5,0 kg

DIMENSIONS



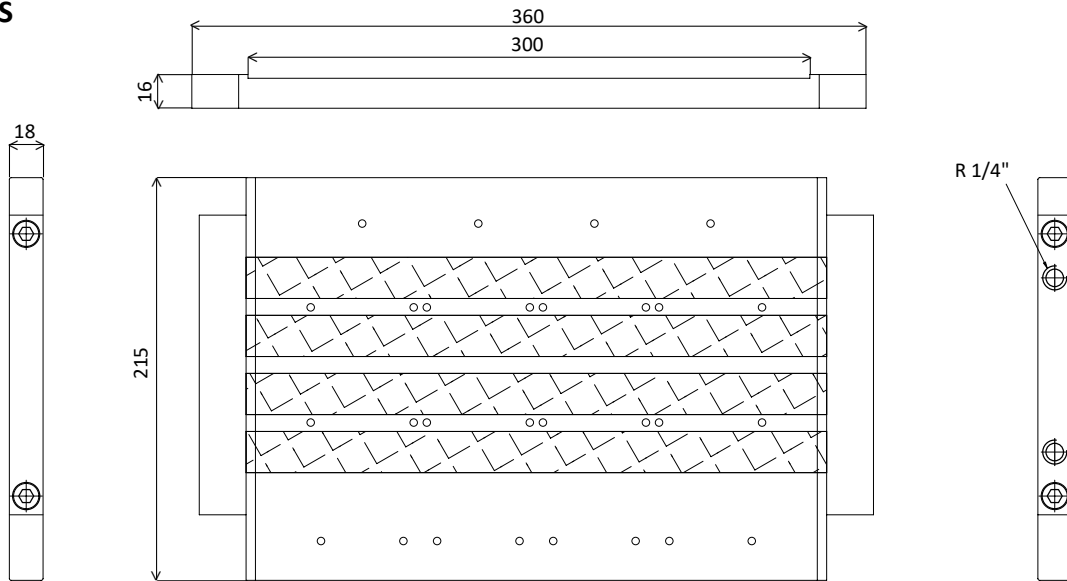
PERFORMANCE

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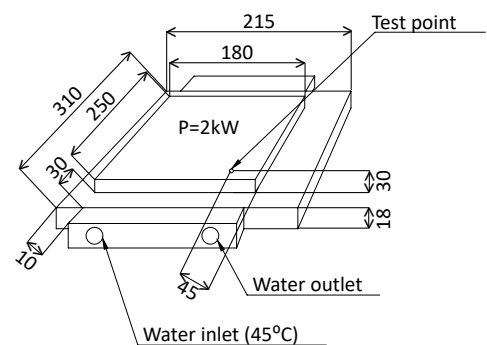
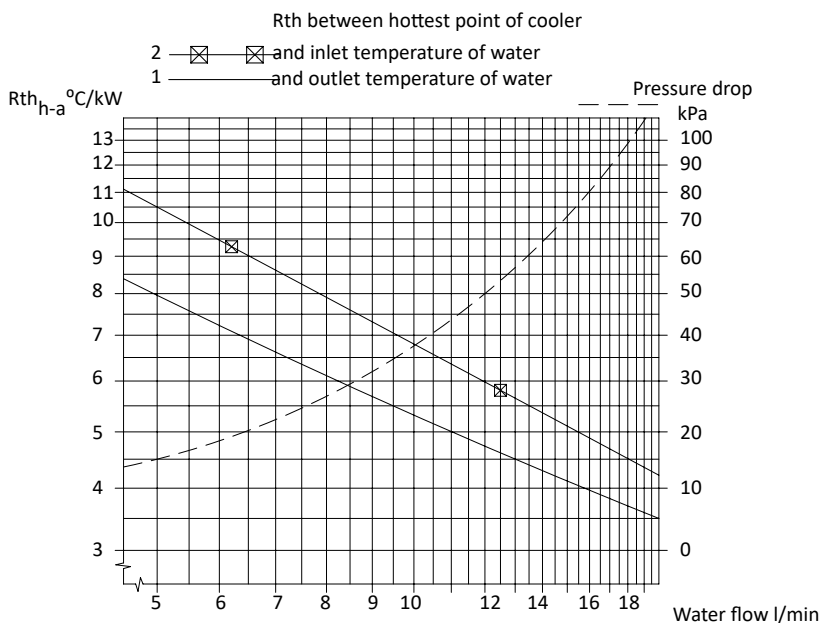
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² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Semikron SKiiP4 (4x)	Water-Glycol 50-50%	12 l/min at 50 kPa	180 x 250	6 (inlet)	3,8 kg

DIMENSIONS



PERFORMANCE

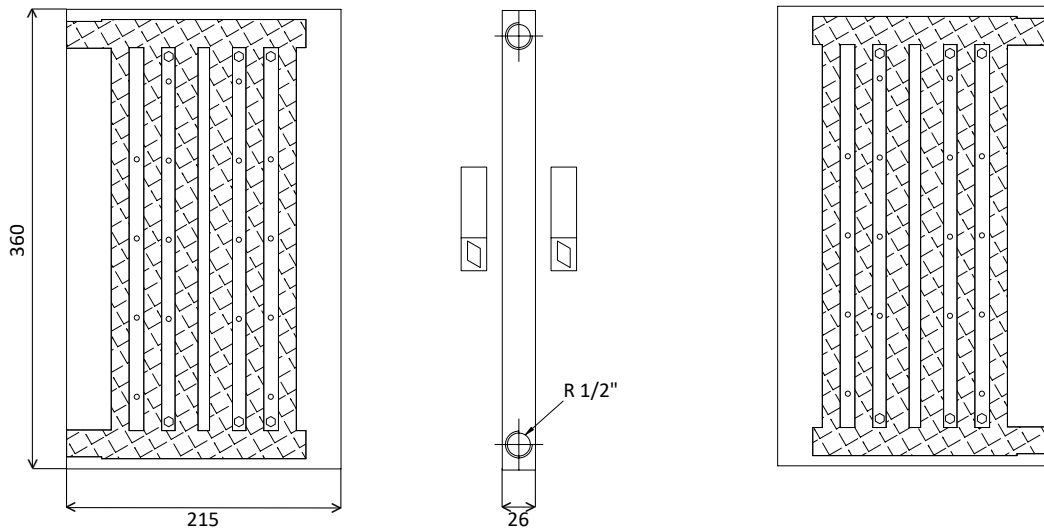


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Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Semikron SKiiP3 (8x, double sided)	Water-Glycol 50-50%	25 l/min at 100 kPa	62 x 122 (8x)	n.s	5,4 kg

DIMENSIONS



PERFORMANCE

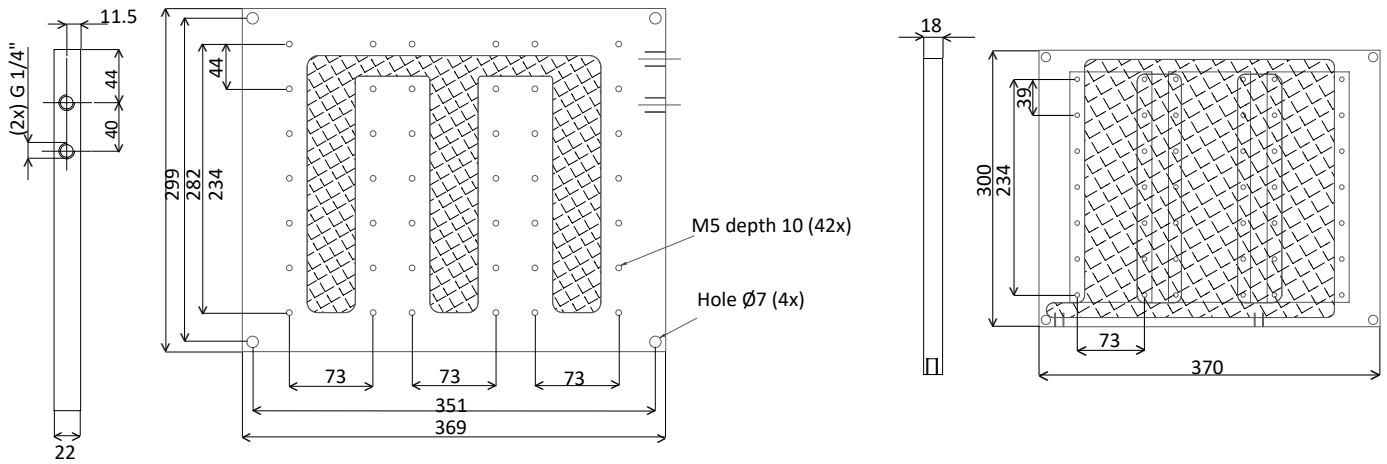
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² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Infinion PrimePACK3 (3x)	Water-Glycol 50-50%	7 l/min at 50 kPa	89 x 250 (3x)	< 15 (inlet)	5,4 kg

DIMENSIONS

Remark: Temperature rise across and between components < 1.5 K/kW



PERFORMANCE

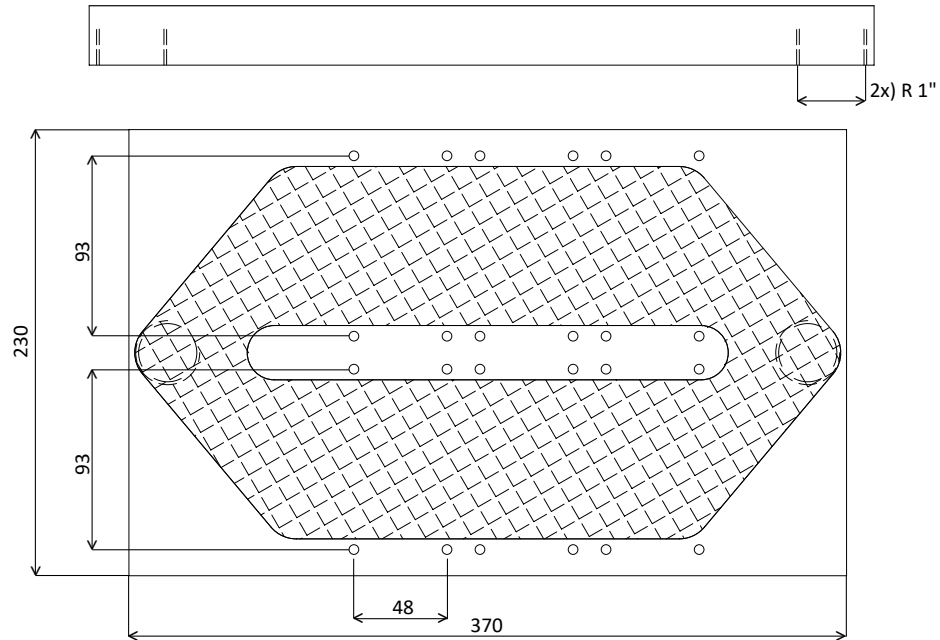
SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.

² uniform heat sources ³ Rth at conditions as in (¹)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
62 mm housing (6x)	Oil	50 l/min, 200 kPa	60 x 105 (6x)	< 50 (n.s)	6,4 kg

DIMENSIONS



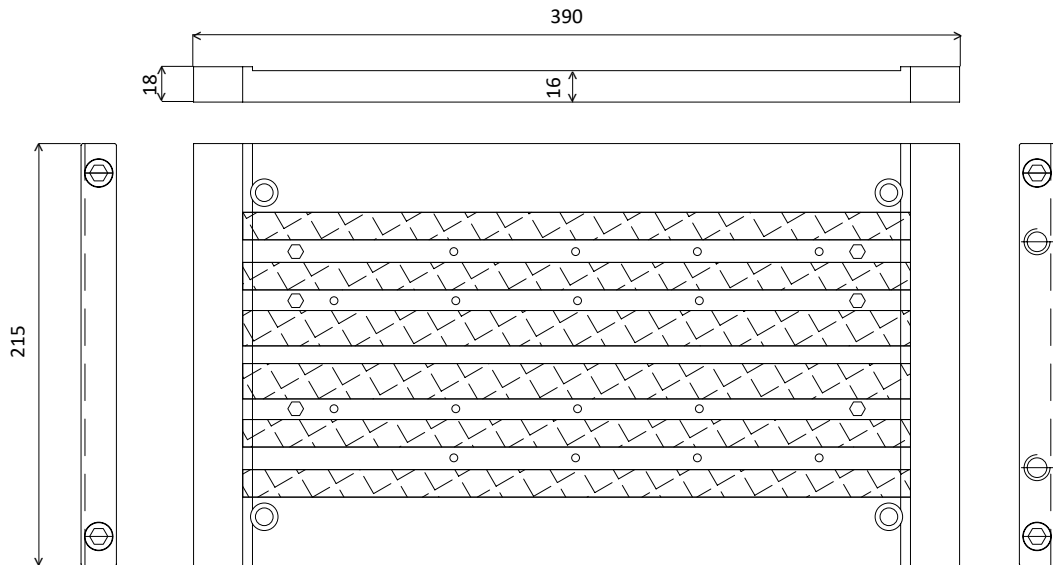
PERFORMANCE

SPECIFICATION

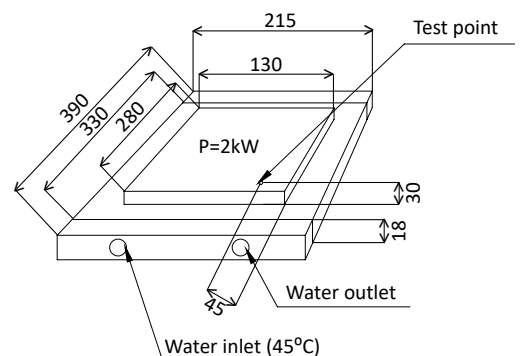
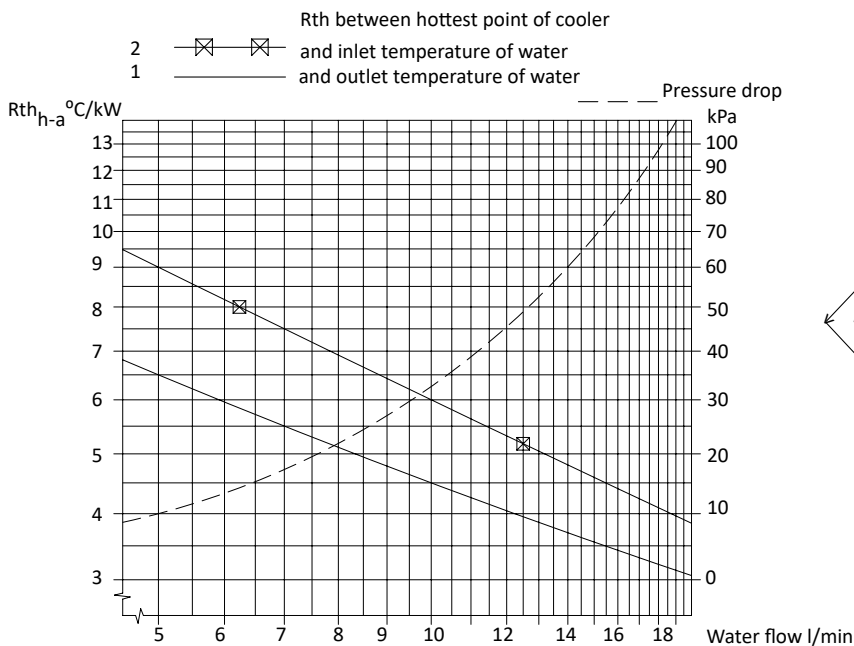
¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Semikron SKiiP3 (8x, double sided)	Water-Glycol 50-50%	12 l/min, 45 kPa	130 x 280	5,3 (inlet)	4,1 kg

DIMENSIONS



PERFORMANCE

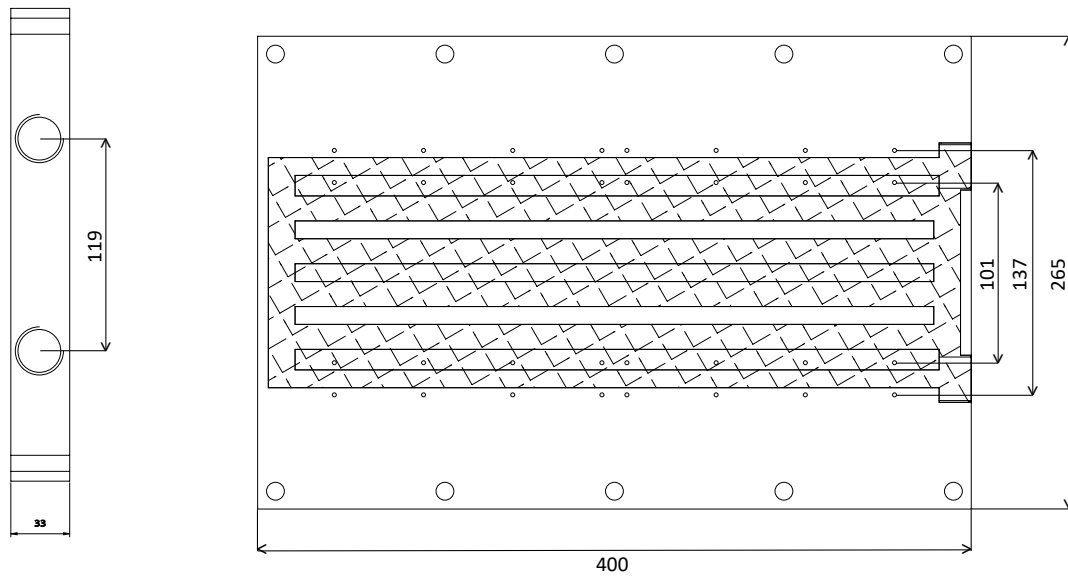


SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Universal cooler SKiM63 or SKiM93	Oil	50 l/min, 200 kPa	120 x 160	< 17 (inlet)	9,4 kg

DIMENSIONS



PERFORMANCE

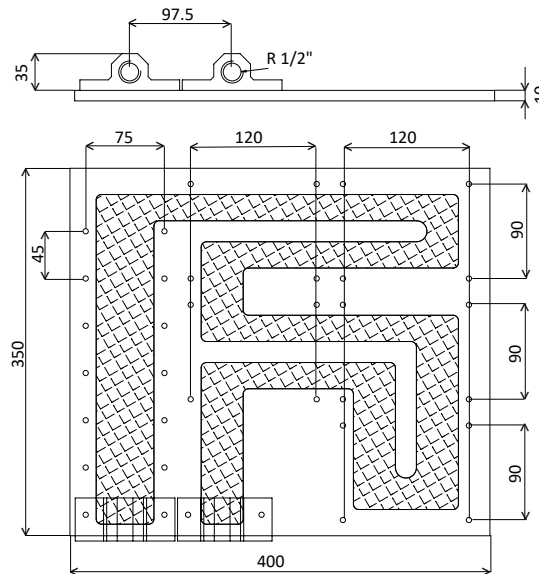
SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.

² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight

DIMENSIONS



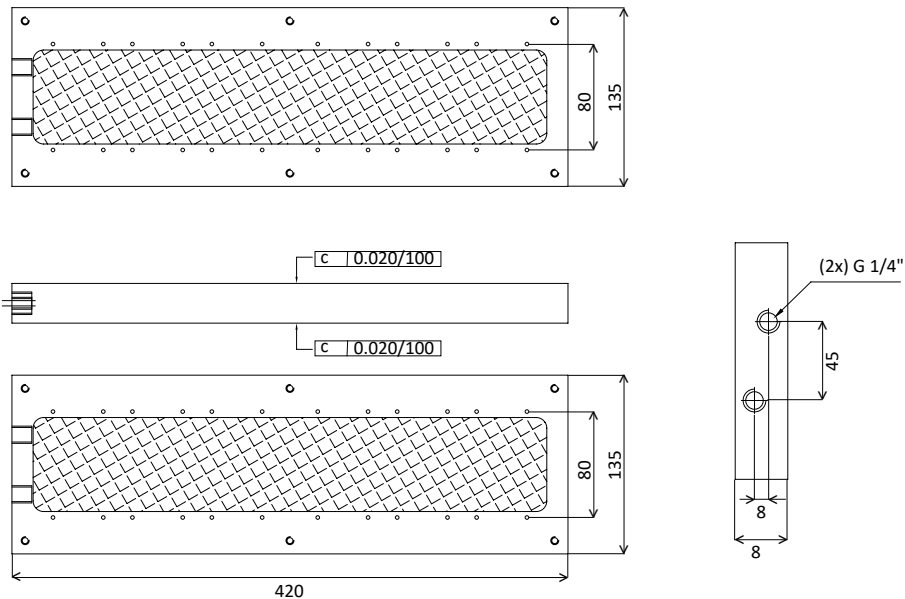
PERFORMANCE

SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Drill pattern 38 x 80 (12x, double sided)	Water-Glycol 50-50%	8 l/min, 10 kPa	50 x 92	40 (average)	4,6 kg

DIMENSIONS



PERFORMANCE

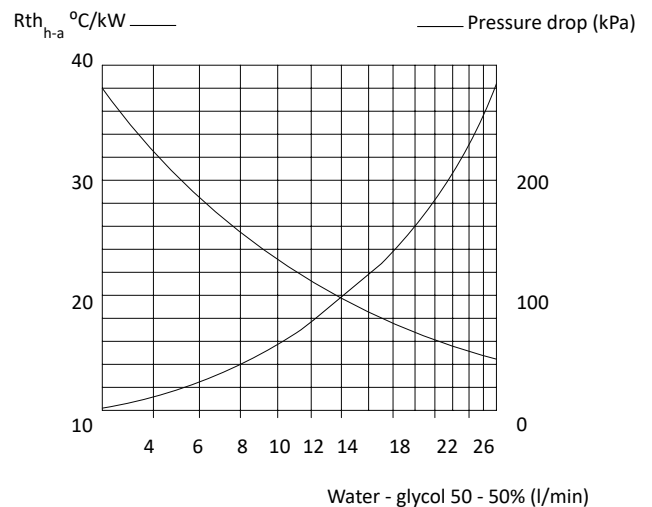
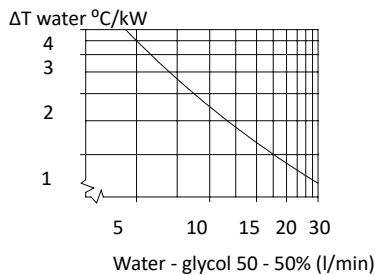
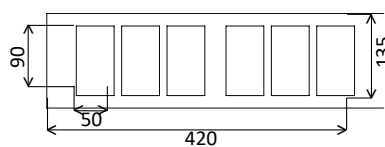
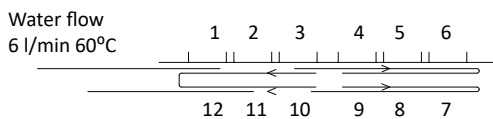
COOLER VK - 420- 135- 30 - CA

Comp. 1-6 P =523 W Cooler temp. = 81°C. All comp. will have the same temp.
 Comp 7-12 P =406 W Cooler temp. = 83°C. All comp. will have the same temp.
 Water flow 7 l/min will give cooler temp. 78° and 80° C.

Calculated

$$R_{th} = \frac{T_{Cooler (1-6)} - (Water T_{inlet} + 1/3 T_{water})}{P / Comp (600W)} \text{ } ^\circ C/kW =$$

$$= \frac{T_{Cooler (7-12)} - (Water T_{inlet} + 2/3 T_{water})}{P / Comp (600W)} \text{ } ^\circ C/kW$$



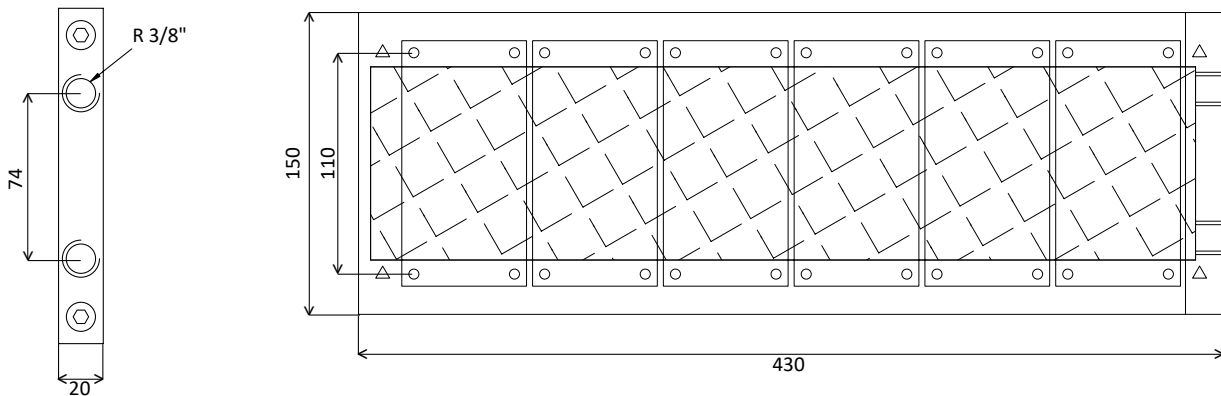
SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.

² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Infineon EconoPACK™3 (6x)	Water-Glycol 50-50%	16 l/min, 50-70 kPa	62 x 125 (6x)	< 18 (outlet)	3,5 kg

DIMENSIONS



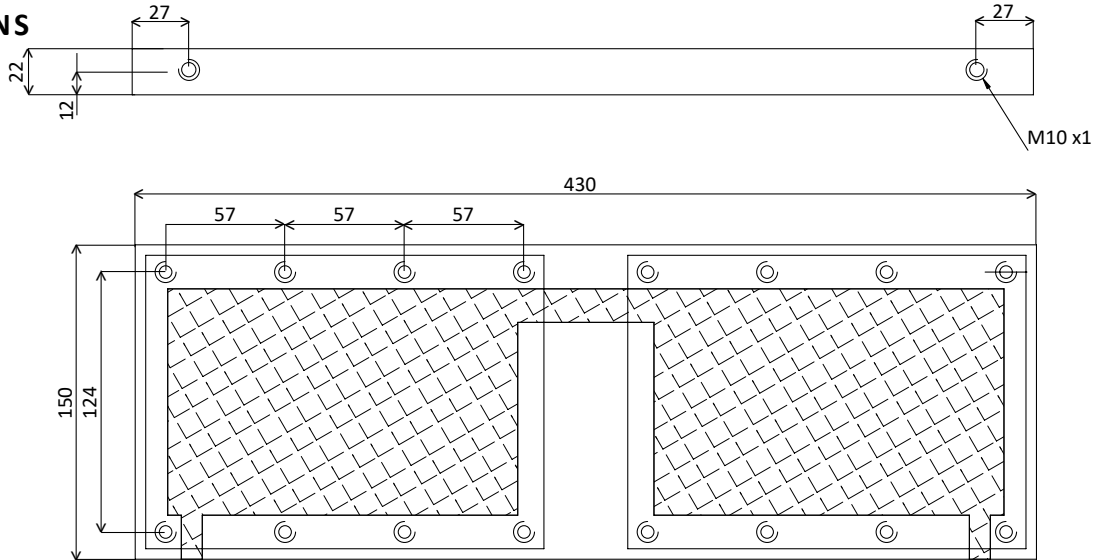
PERFORMANCE

SPECIFICATION

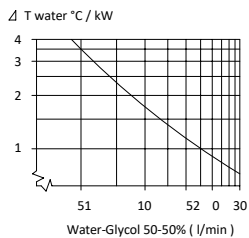
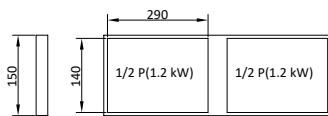
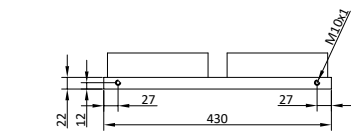
¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
140 x 190 (2X)	Water-Glycol 50-50%	10 l/min, 40 kPa	140 x 190 (2x)	3,2 (outlet)	3,8 kg

DIMENSIONS

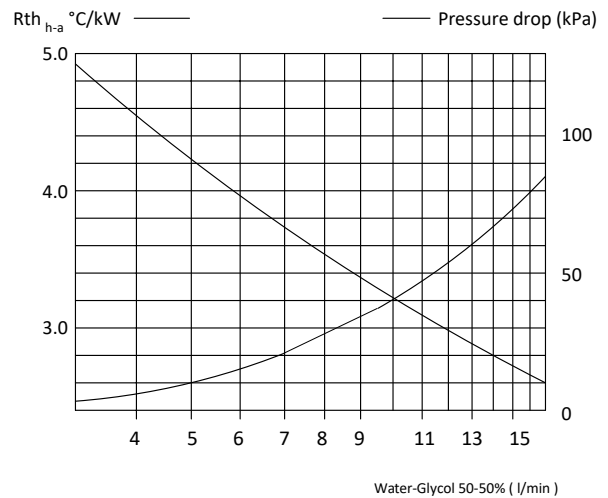


PERFORMANCE



$$Rth = \frac{\text{Max T (°C) Cooler} - \text{Max T (°C) Water (Outlet)}}{P_{tot} \text{ (kW)}} \quad (\text{°C/kW})$$

$$Rth / \text{Component} = \text{Diagram} \times 2$$

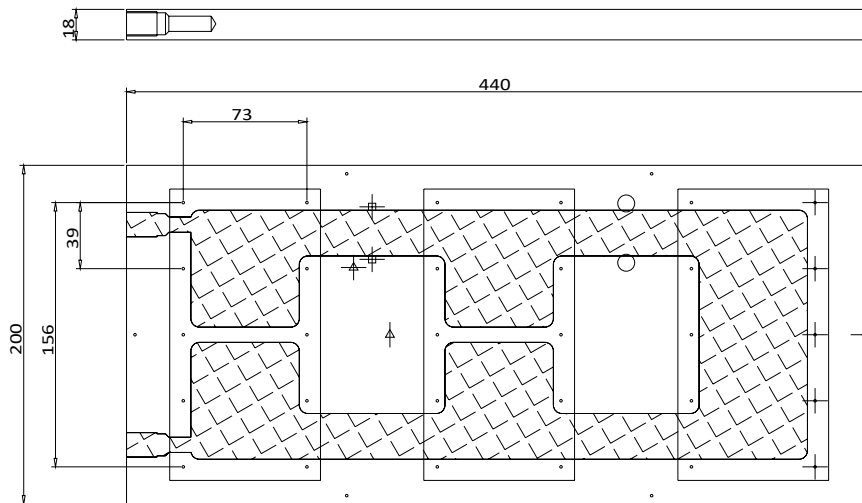


SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Infineon PrimePACK2 (3x)	Water-Glycol 50-50%	10 l/min, n.s	89 x 172 (3x)	n.s	4,3kg

DIMENSIONS



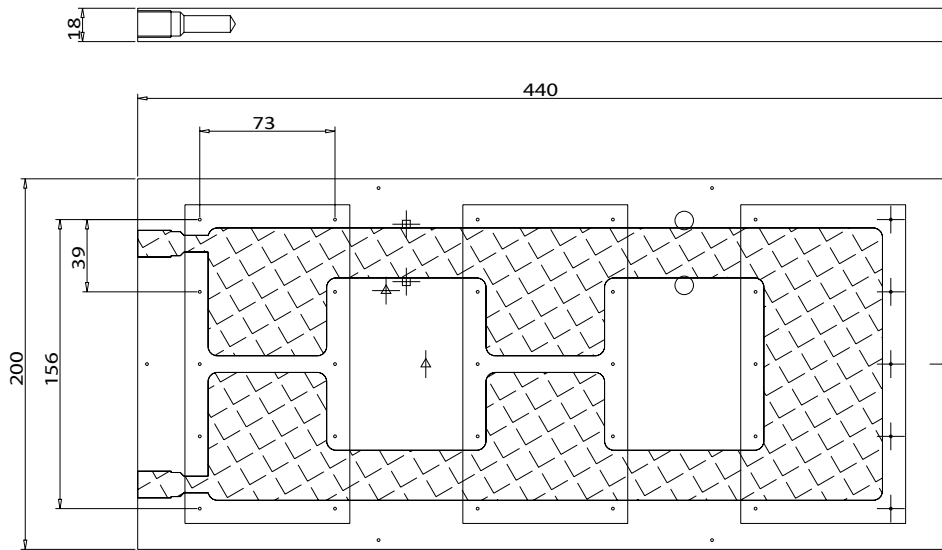
PERFORMANCE

SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Infineon PrimePACK2 (3x)	Water-Glycol 50-50%	10 l/min, n.s	89 x 172 (3x)	n.s	4,3kg

DIMENSIONS



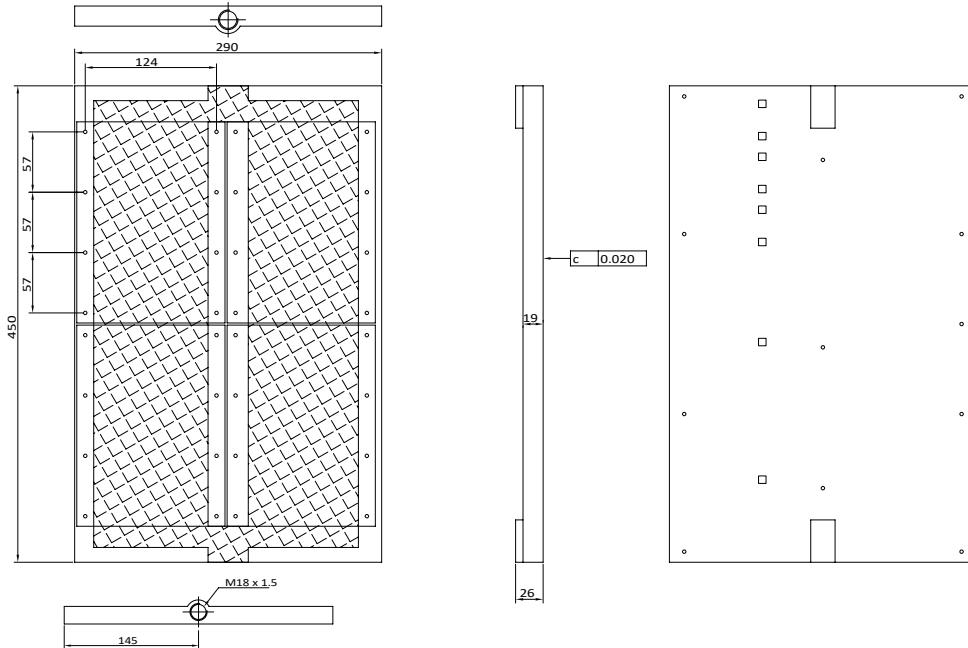
PERFORMANCE

SPECIFICATION

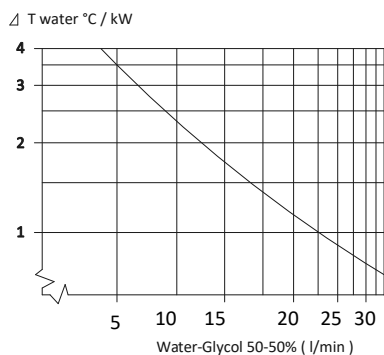
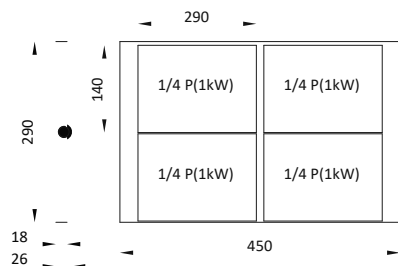
¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
140 x 190 (4x)	Water-Glycol 50-50%	16 l/min, 25 kPa	140 x 190 (4x)	11,5 (outlet)	9,3kg

DIMENSIONS

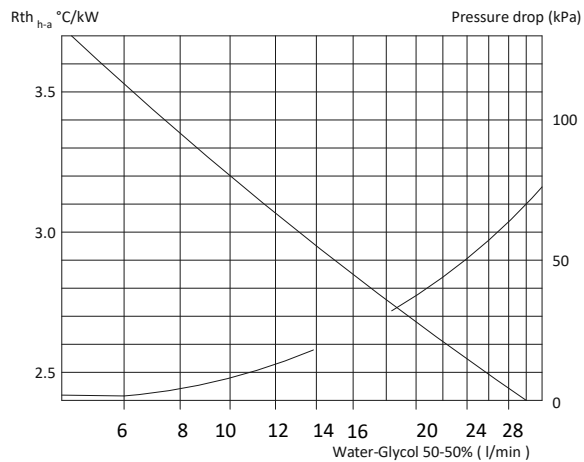


PERFORMANCE



$$R_{th} = \frac{\text{Max } T (^{\circ}\text{C}) \text{ Cooler} - \text{Max } T (^{\circ}\text{C}) \text{ Water (Outlet)}}{P_{tot} \text{ (kW)}} \quad (^{\circ}\text{C} / \text{kW})$$

$$R_{th} / \text{Component} = \text{Diagram} \times 4$$



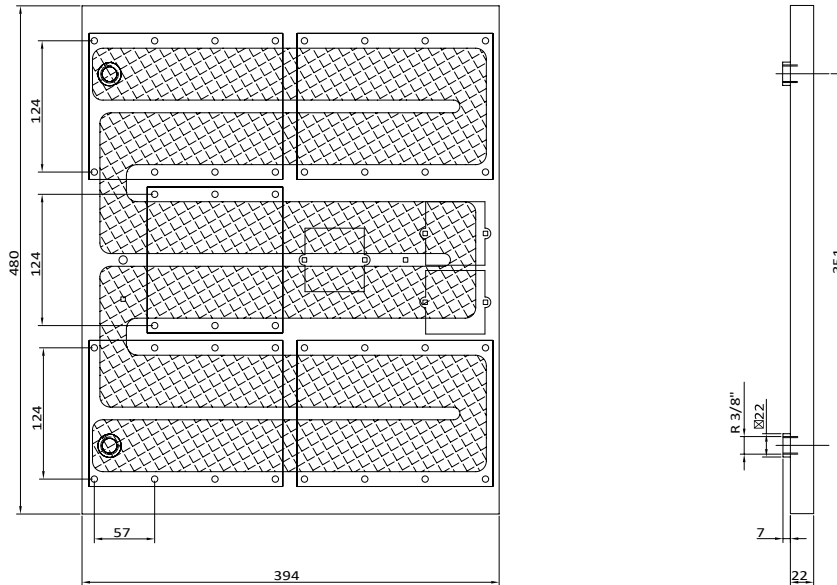
SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.

² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
140 x 190 (4x) + 130 x 140 (1x) + comp	Water-Glycol 50-50%	8 - 15 l/min, 70 - 200 kPa	140 x 190 (4x)	3 - 6 (n.s)	11,4kg

DIMENSIONS



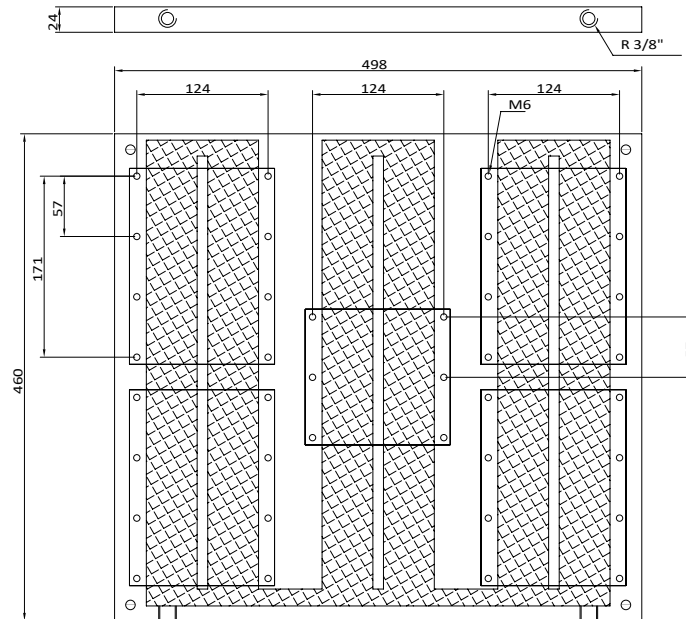
PERFORMANCE

SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (¹)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
140 x 190 (4x) + 130 x 140 (1x)	Water-Glycol 50-50%	20 l/min, 140 kPa	140 x 190 (4x)	5 (n.s)	14,8 kg

DIMENSIONS



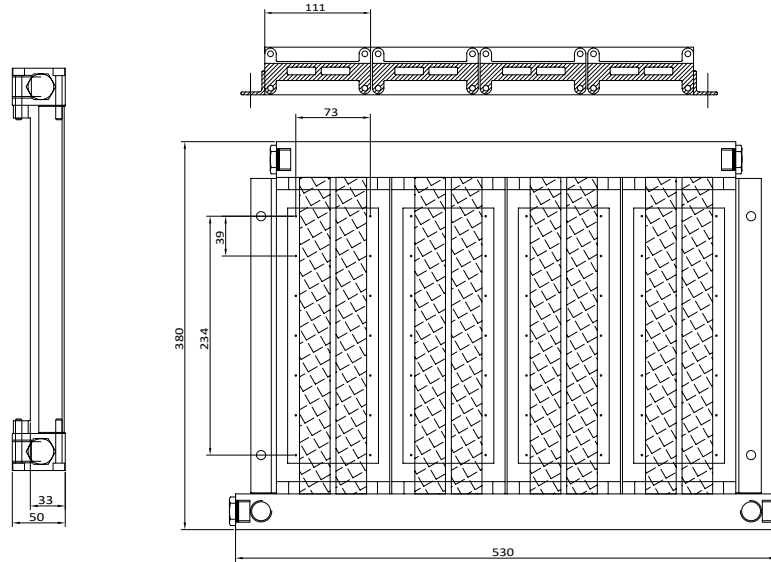
PERFORMANCE

SPECIFICATION

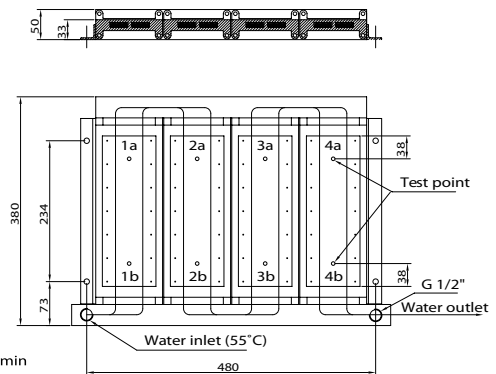
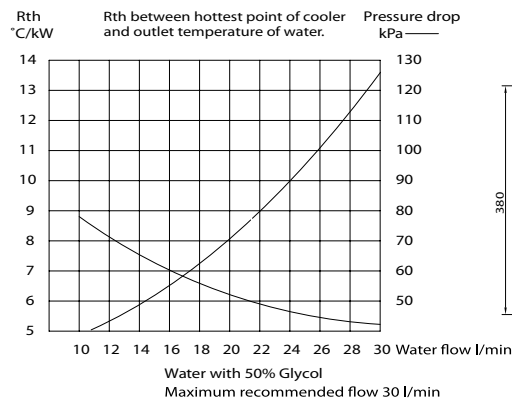
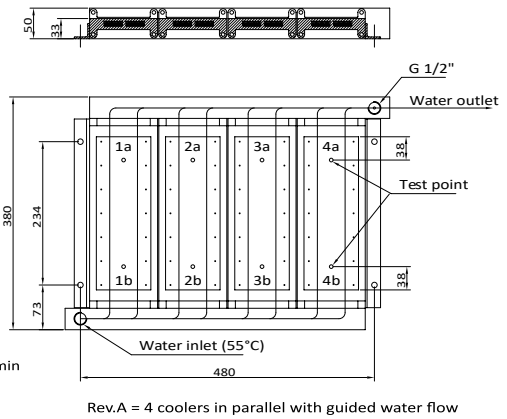
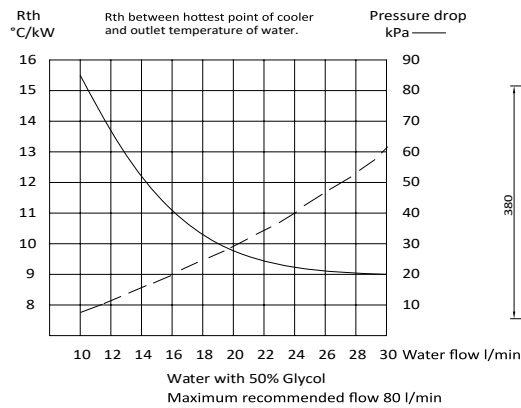
¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Infineon PrimePACK3 (4x)	Water-Glycol 50-50%	20 l/min, 30 - 70 kPa	90 x 270 (4x)	6,2 - 9,8 (outlet)	11,5 kg

DIMENSIONS



PERFORMANCE



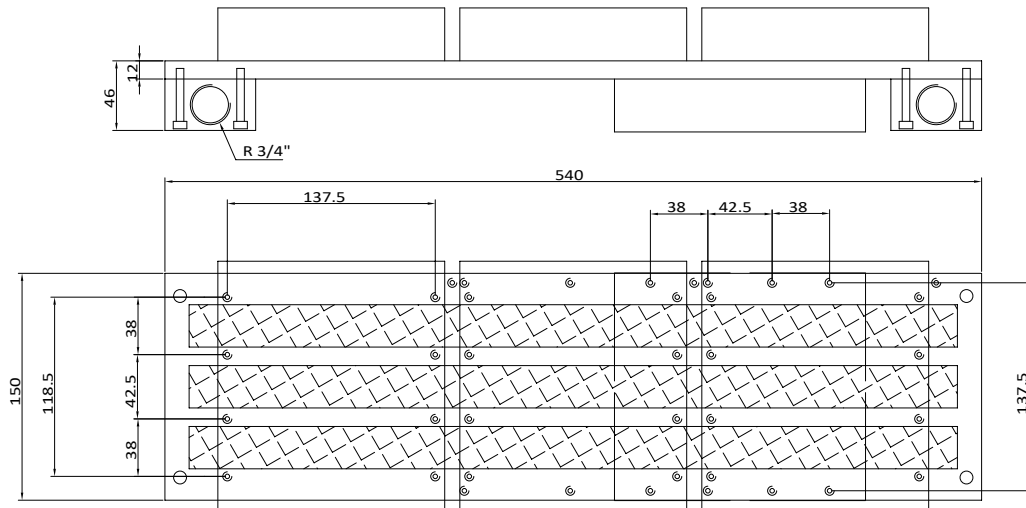
SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.

² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Mitsubishi 150 x 166 (3x)	Water-Glycol 50-50%	20 l/min, 50 kPa	150 x 166	< 5 (n.s)	3,6 kg

DIMENSIONS



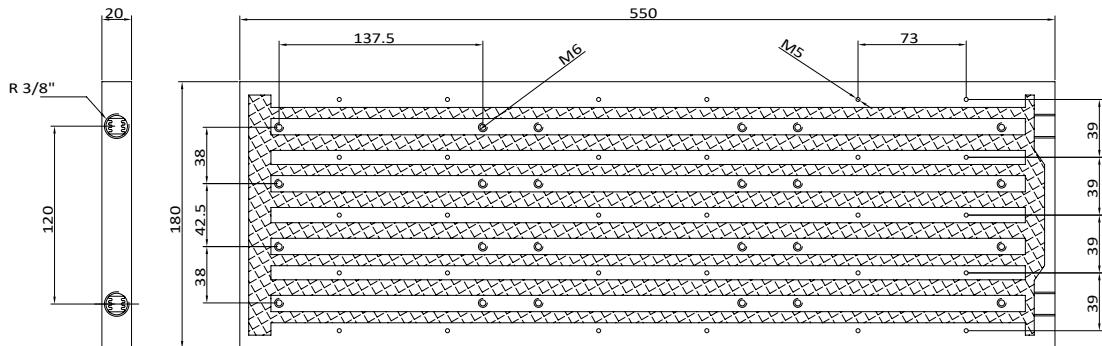
PERFORMANCE

SPECIFICATION

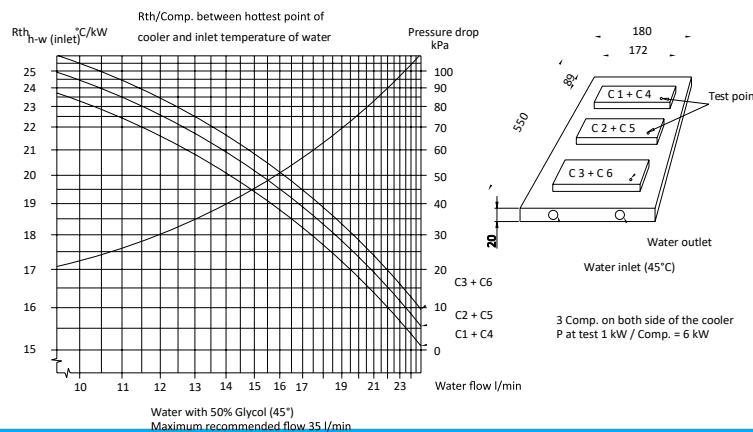
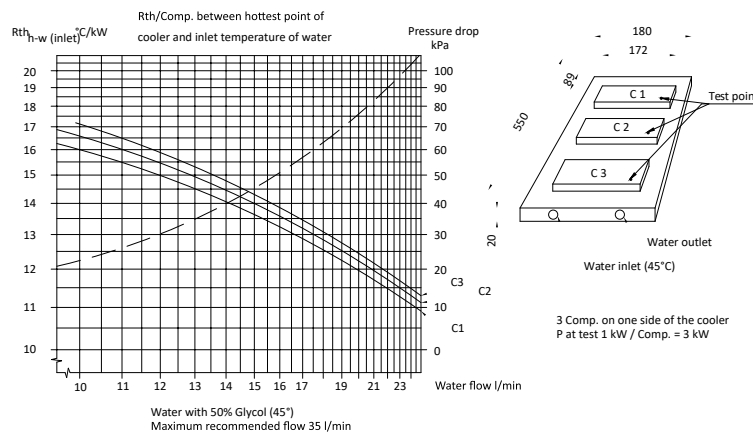
¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Universal cooler for Mitsubishi 150 x 166 or PP2 (6x, double sided)	Water-Glycol 50-50%	16 l/min, 50 kPa	89 x 172 (3x,6x)	13,8, 20,2 (inlet)	5,3 kg

DIMENSIONS



PERFORMANCE

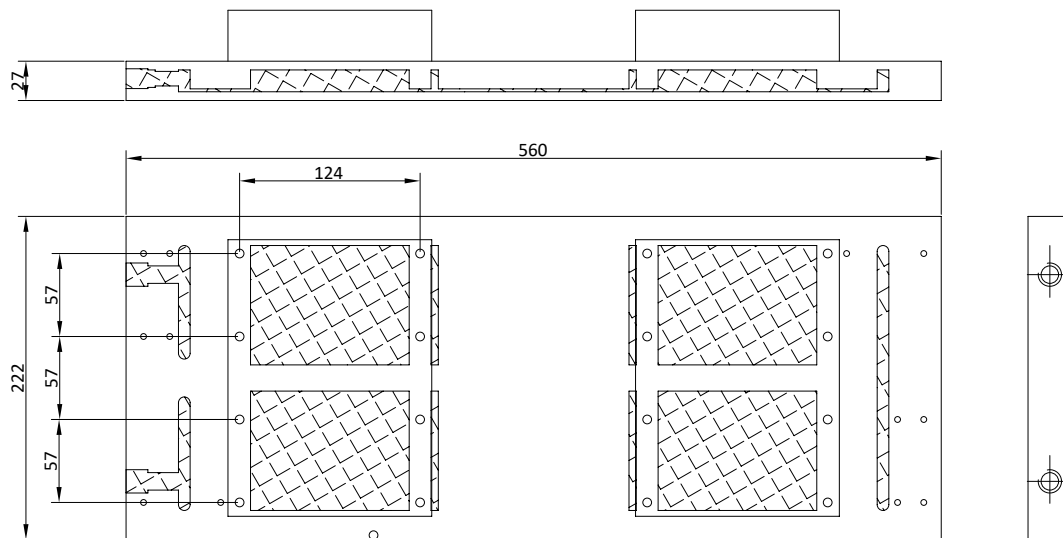


SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
140 x 190 (2x)	Water-Glycol 50-50%	6 - 18 l/min, 30 - 160 kPa	140 x 190 (2x)	3 (n.s)	9 kg

DIMENSIONS



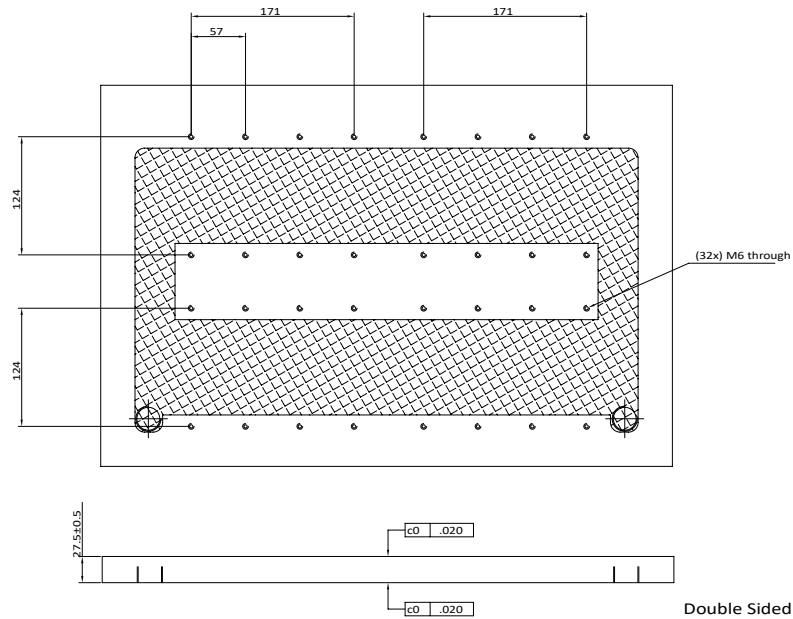
PERFORMANCE

SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (¹)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
140 x 190 (8x, double sided)	Water-Glycol 50-50%	30 l/min, n.s	140 x 190 (8x)	< 10 (inlet)	17 kg

DIMENSIONS



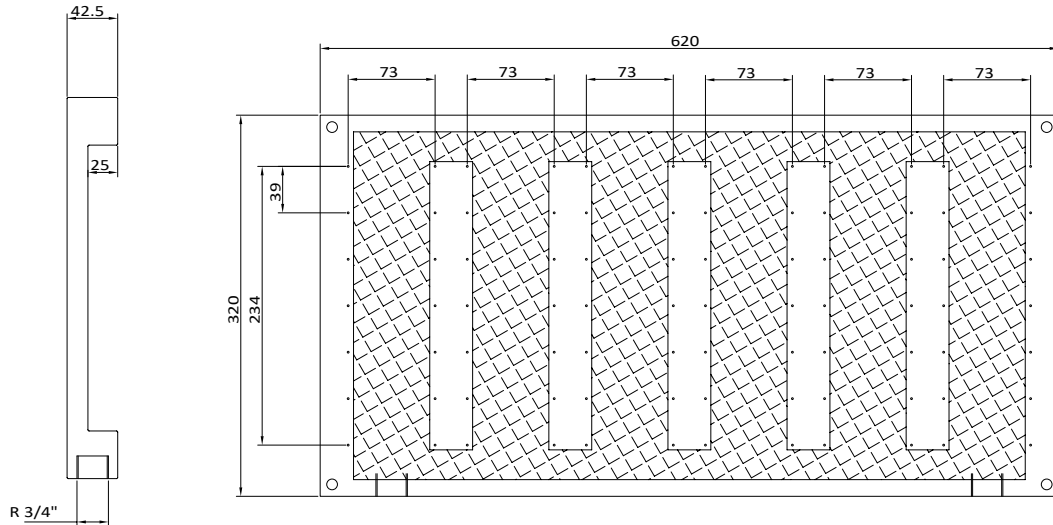
PERFORMANCE

SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
PrimePack3 (6x)	Water-Glycol 50-50%	20 l/min, 100 - 130 kPa	89 x 250 (6)	6 -9 (average)	11 kg

DIMENSIONS



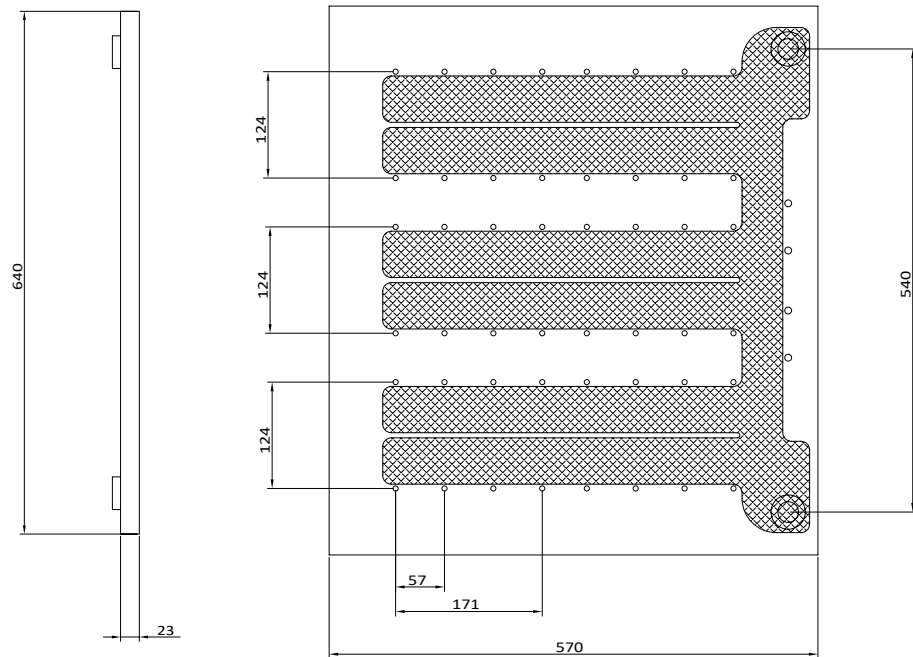
PERFORMANCE

SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
140 x 190 (6x)	Water-Glycol 50-50%	30 l/min, 60 kPa	140 x 190 (6x)	< 10 (inlet)	22,6 kg

DIMENSIONS



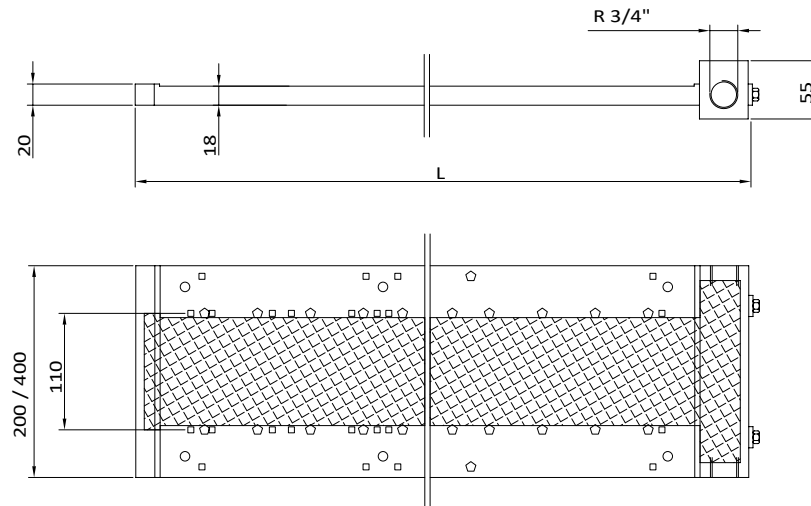
PERFORMANCE

SPECIFICATION

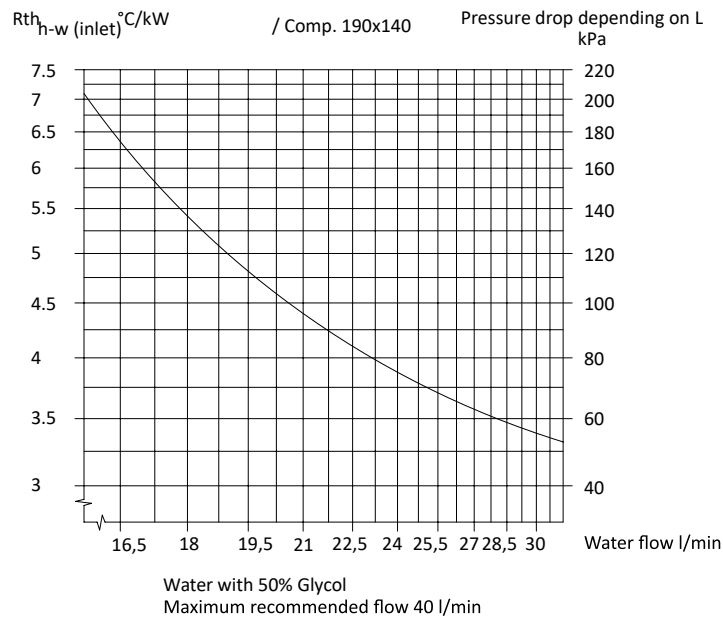
¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
122 x 162, EconoPACK™ (multiple)	Water-Glycol 50-50%	20 l/min, 110 kPa	140 x 190	5,2 (average)	X

DIMENSIONS



PERFORMANCE

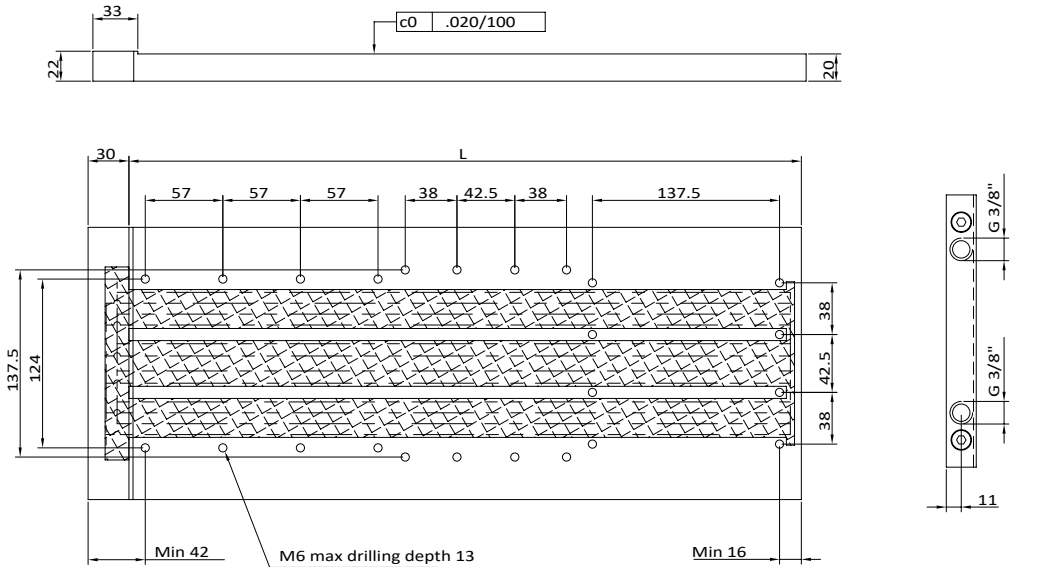


SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Universal 140 x 190 or 150 x 166	Water-Glycol 50-50%	20 l/min, 100 kPa	140 x 190	< 5 (average)	X

DIMENSIONS



Max water flow 22 l/min

PERFORMANCE

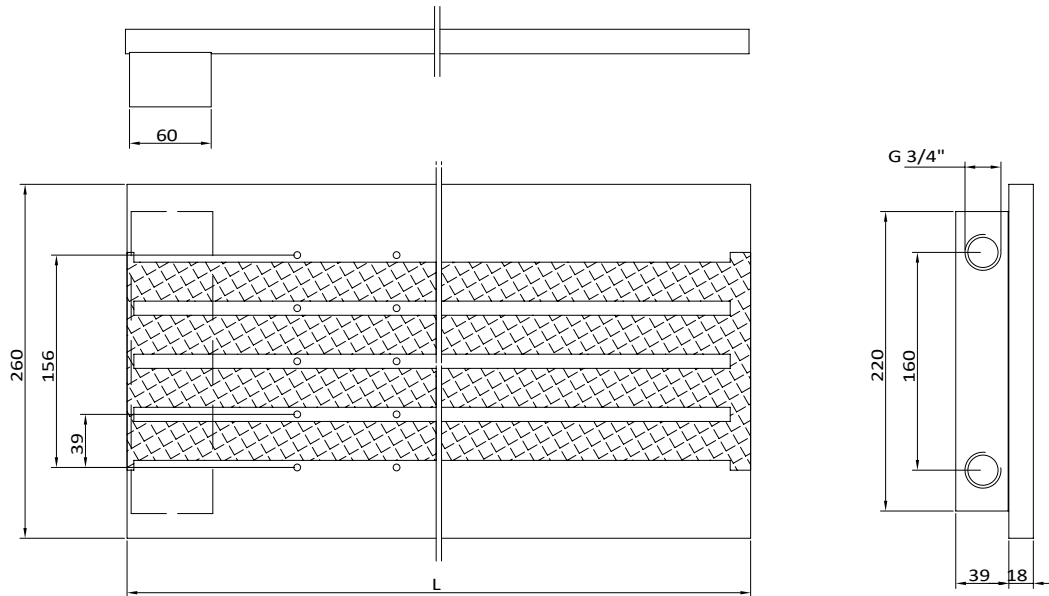
SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.

² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Infinion PrimePACK2 (multiple)	Water-Glycol 50-50%	25 l/min, 65 kPa	89 x 172	9,2 (average)	X

DIMENSIONS



PERFORMANCE

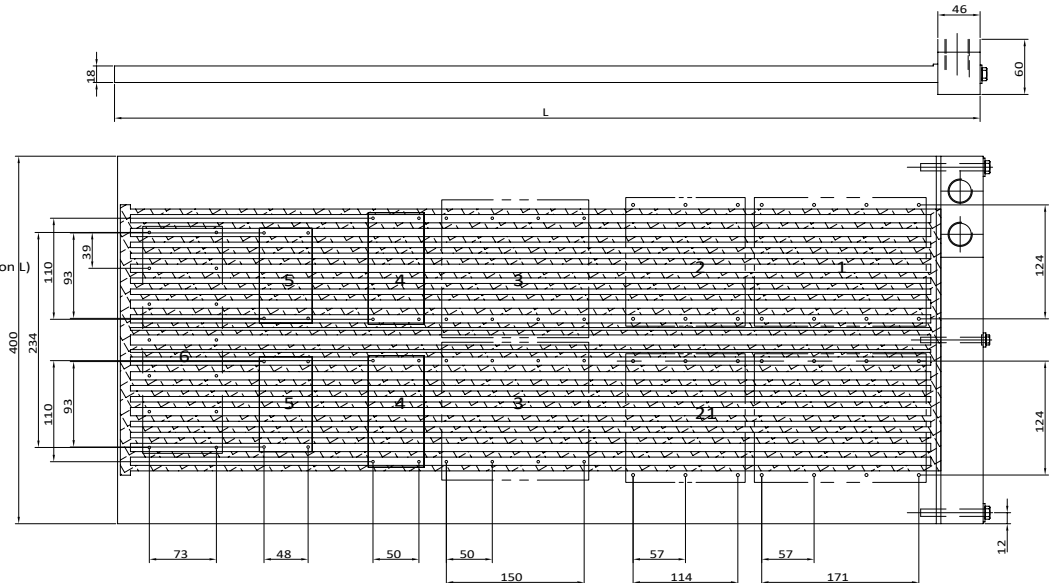
SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Universal cooler for 130 x 140, 140 x 190, 150 x 166, 62 mm, PP2 and PP3	Water-Glycol 50-50%	30 l/min, 50 - 100 kPa	140 x 190	< 5 (n.s)	X

DIMENSIONS

Calculated.
 Flow 30 l/min (max flow 48 l/min.)
 Pressure drop 50-100 kPa (depending on L)
 Rth_{H-W} (average temp.)
 5°C/kW (Comp.1)
 8°C/kW (Comp.2)
 6°C/kW (Comp.3)
 17°C/kW (Comp.4)
 20°C/kW (Comp.5)
 7°C/kW (Comp.6)



PERFORMANCE

Rth _{H-W} (average temp)		
Comp. 1	140 x 90	< 5 K/kw
Comp. 2	130 x 140	< 8 K/kw
Comp. 3	150 x 166	< 6 K/kw
Comp. 4	62 mm	< 17 K/kw
Comp. 5	62 mm	< 20 K/kw
Comp.6	PrimePACK3	< 7 K/kw

Temperature rise across and between components < 1,5 K/kw
Flow 30 l/min (max flow 48 l/min)
Pressure drop 50 100 kPa (depending on L)

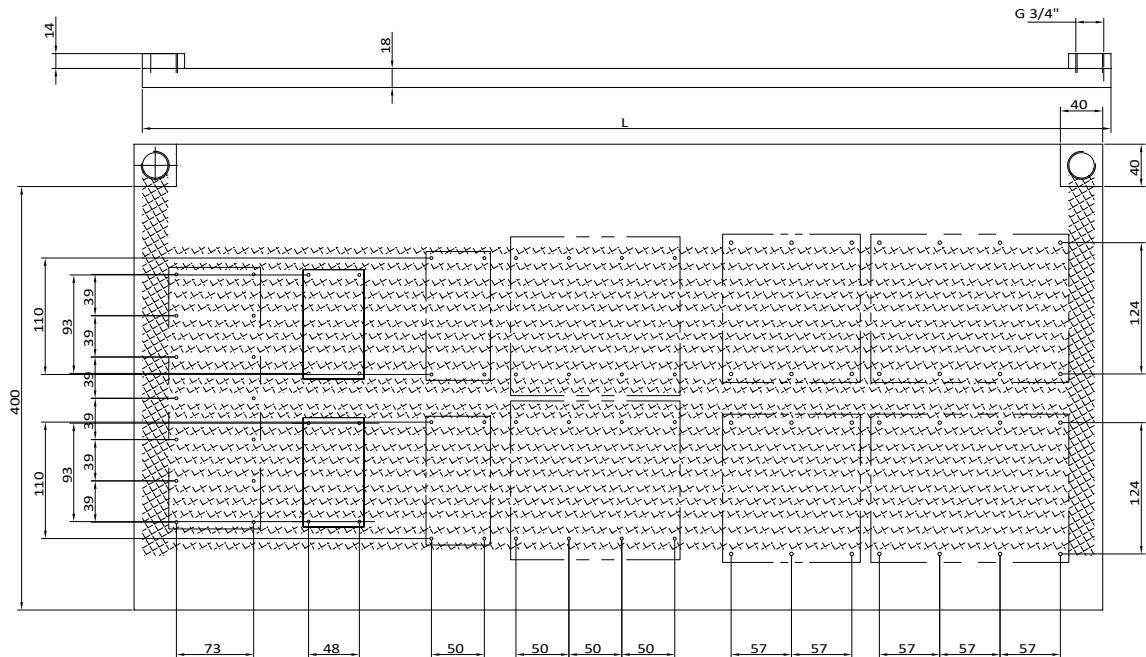
SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.

² uniform heat sources ³ Rth at conditions as in (1)

Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
Universal cooler for 130 x 140, 140 x 190, 150 x 166, 62 mm, PP2 and PP3	Water-Glycol 50-50%	30 l/min, 100 kPa	140 x 190	< 7 (n.s)	X

DIMENSIONS



PERFORMANCE

Rth _{H-W} (average temp)		
Comp. 1	140 x 90	< 7 K/kw
Comp. 2	130 x 140	< 11 K/kw
Comp. 3	150 x 166	< 8 K/kw
Comp. 4	62 mm	< 22 K/kw
Comp. 5	62 mm	< 26 K/kw
Comp.6	PrimePACK3	< 9 K/kw

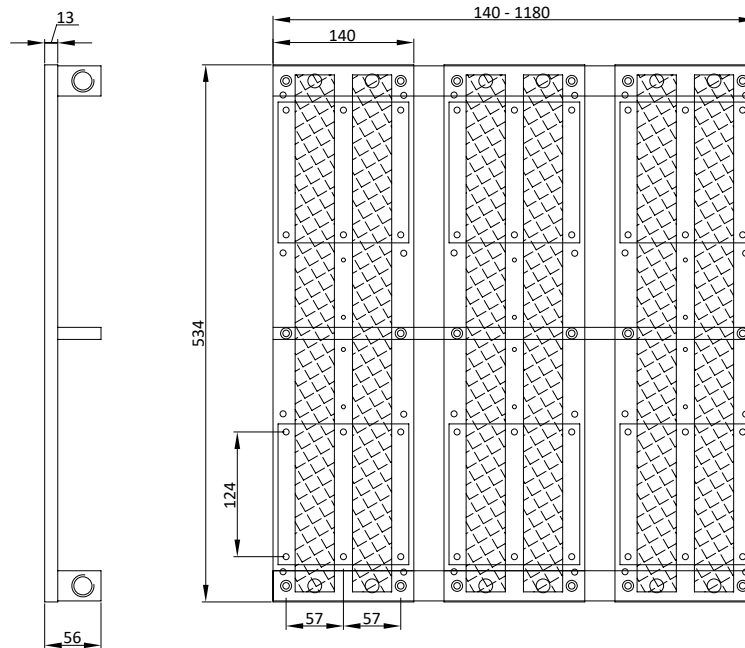
Flow 30 l/min (max 60 l/min) - Pressure drop 30 - 100 kPa (depending on L)

SPECIFICATION

¹ selected values for quick selection, often at 2/3 of recommended maximum flow.
² uniform heat sources ³ Rth at conditions as in (1)

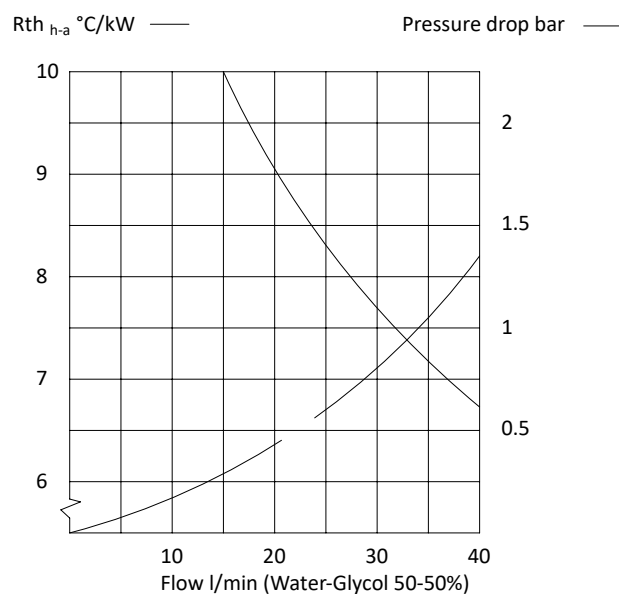
Suitable for semiconductor components	Fluid	Flow rate, pressure drop Δp^1	Heat sources ²	Rth K7kW/Comp (ref.temp) ³	Weight
130 x 140 (multiple)	Water-Glycol 50-50%	30 l/min, 80 kPa	130 x 140	7,7 (n.s)	X

DIMENSIONS



PERFORMANCE

Rth / IGBT 130x140





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