Parameters	Values	Units
Rth (j-c) IGBT	0.066	K/W
Rth(j-c) FWD	0.120	K/W
Rth(case)1	0.000001	K/W
Rth(case)2	0.000001	K/W
Rth(case)3	0.000001	K/W
Rth(paste)	0.015	K/W
Rth(heatsink)	0.005 – 0.05	K/W

Pss	116.065	W
Psw	116.18	W
Total Power loss of each IGBT	232.25	W
P_{DC}	30.54	W
P_{rr}	11.25	W
Total Power loss of each FWD	41.79	W

Esw(on)	41	mJ
Esw(off)	32	mJ
Fsw	5	kHz
Icp	300	A
V_{CE}(sat)	2	V
V_{EC}	1.8	V
D	0.85	
θ	25.842	Degrees
I_{rr}	200	A
t_{rr}	300	ns
V_{CE}(pk)	300	V

Symbology:

$E_{SW(on)}$:	IGBT's turn-on switching energy per pulse at peak current, I_{CP} and T = 125°C
$E_{SW(off)}$:	IGBT's turn-off switching energy per pulse at peak current, I_{CP} and T = 125°C
f_{SW}:	PWM switching frequency for every inverter arm-switch (normally, $f_{SW} = f_C$)
I_{CP}:	Peak value of sinusoidal output current ($I_{CP} = I_{EP}$)
$V_{CE}(sat)$:	IGBT saturation voltage drop @I_{CP} and T = 125°C
V_{EC}:	FWD forward voltage drop @ I_{EP}
D:	PWM duty factor (modulation depth)
θ:	Phase angle between output voltage and current
I_{rr}:	Diode peak recovery current
t_{rr}:	Diode reverse recovery time
$V_{CE}(pk)$:	Peak voltage across the diode at recovery

Pss: Steady-state loss per switching IGBT

Psw: Switching loss per switching IGBT

P_{DC}: Steady-state loss per diode

P_{rr}: Recovery loss per diode

Rth (j-c): thermal resistance junction to case

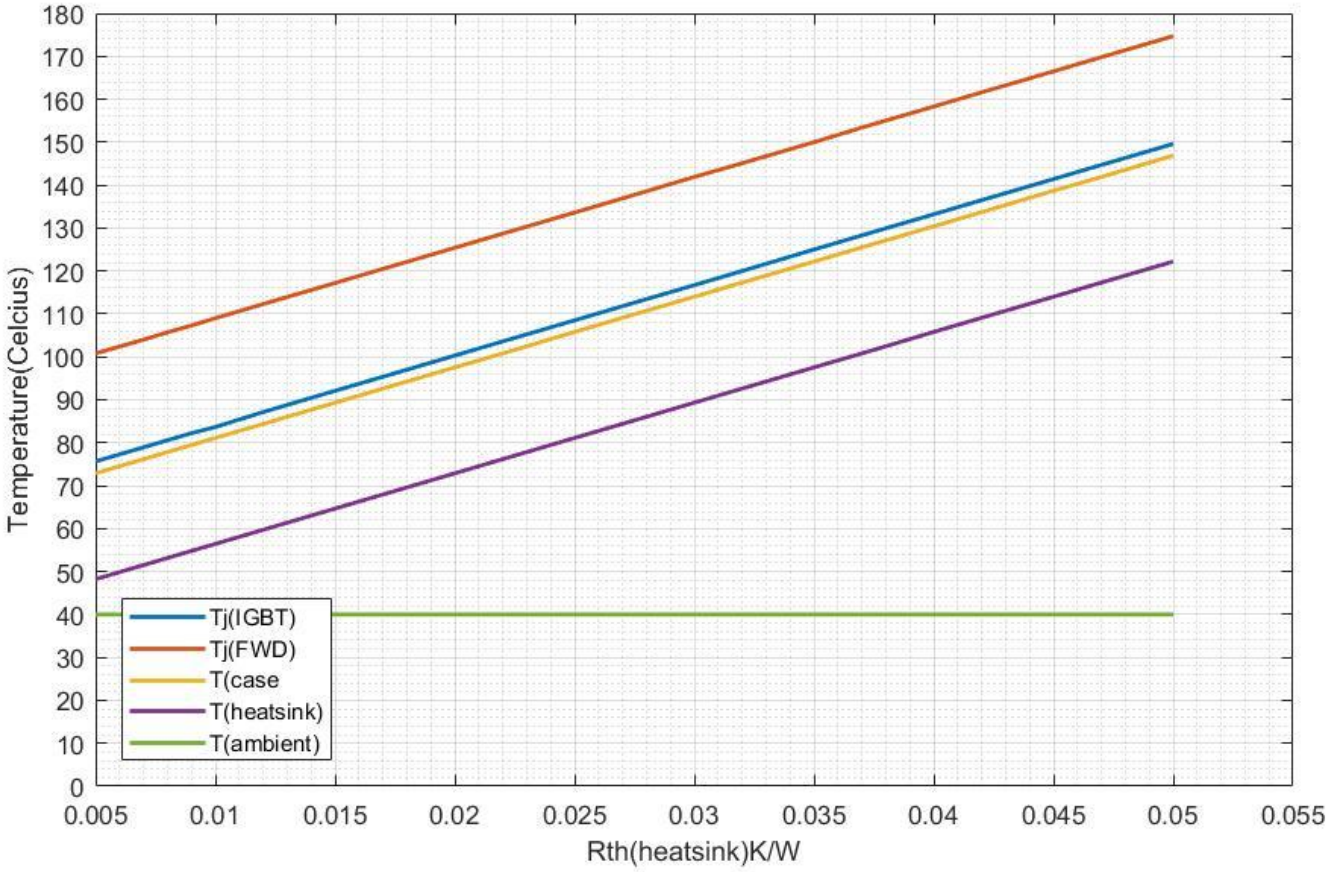
Tj IGBT 1U: Junction temperature of the upper IGBT of the phase 1

Tj IGBT 1L: Junction temperature of the lower IGBT of the phase 1

Tj FWD 1U: Junction temperature of the upper free-wheeling diode of the phase 1

Tj FWD 1L: Junction temperature of the lower free-wheeling diode of the phase 1

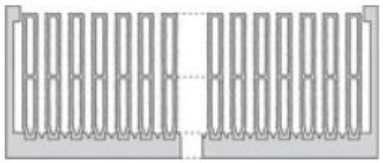
Data	Rth(heatsink) K/W	Tj IGBT (celcius)	Tj FWD(celcius)	T(case)	T(heatsink)	Ta
1	0.005	75.64	100.8	72.88	48.22	40
2	0.006	77.29	102.4	74.53	49.87	40
3	0.007	78.93	104	76.17	51.5	40
4	0.008	80.58	105.7	77.82	53.15	40
5	0.009	82.22	107.3	79.46	54.8	40
6	0.010	83.66	109	81.11	56.44	40
7	0.012	87.15	112.3	84.39	59.73	40
8	0.015	92.09	117.2	89.33	64.66	40
9	0.017	95.37	120.5	92.62	67.95	40
10	**0.020**	**100.3**	**125.4**	**97.55**	**72.88**	**40**
11	0.022	103.6	128.7	100.8	76.17	40
12	0.025	108.5	133.6	105.8	81.11	40
13	0.027	111.8	136.9	109.1	84.39	40
14	0.030	116.7	141.9	114	89.33	40
15	0.032	120	145.1	117.3	92.62	40
16	0.035	125	150	122.2	97.55	40
17	0.037	128.3	153.4	125.5	100.8	40
18	0.040	133.2	158.3	130.4	105.8	40
19	0.042	136.5	161.6	133.7	109.1	40
20	0.045	141.4	166.5	138.7	114	40
21	0.047	144.7	169.8	141.9	117.3	40
22	0.050	149.6	174.7	146.9	122.2	40



- T_j(FWD) = 125.4 ℃ when R_{th}(heatsink) = 0.02 K/W

Heatsink Selection

Data sheet Product SK 461

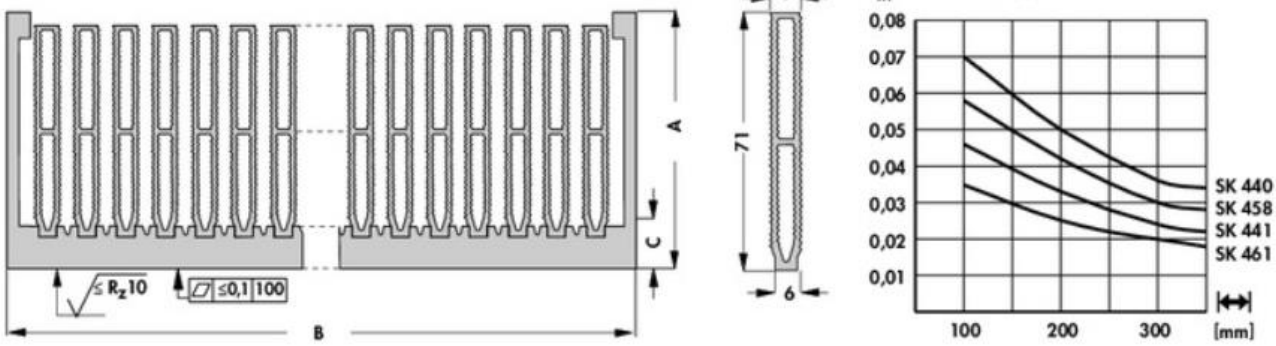


Cooling aggregates > High-performance heatsinks
for forced convection, mounting area(s) milled flat

Features

number of fins	31
width	400 mm
height	88 mm
length	200 / 300 / 1000 mm
thermal resistance R_{th}	0.035 - 0.018 K/W
surface	• black anodised • raw degreased aluminium

Technical Drawing



	88
height	
A [mm]	
B [mm]	400
C [mm]	20

Data sheet Product SK 604

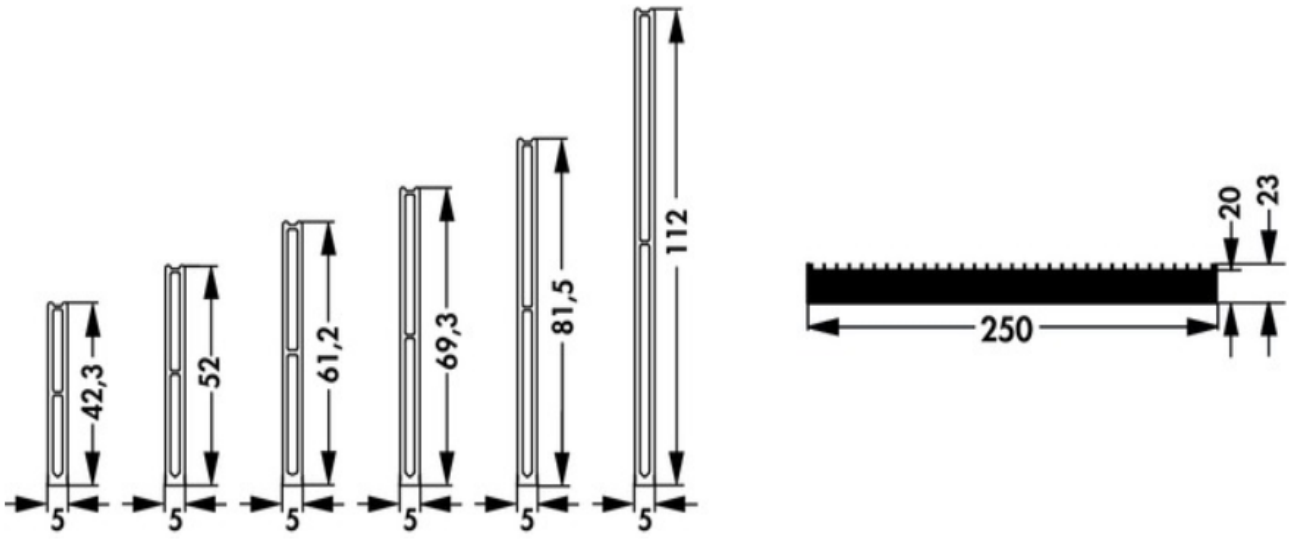
Cooling aggregates > High-performance heatsinks

- high capacity heatsinks for fan operation preferably for radial- or tangential fan motors
- universal modular design
- exclusively for forced convection
- flow-optimized hollow fin geometry
- minimum order quantity: 1000 kg, samples on request

Features

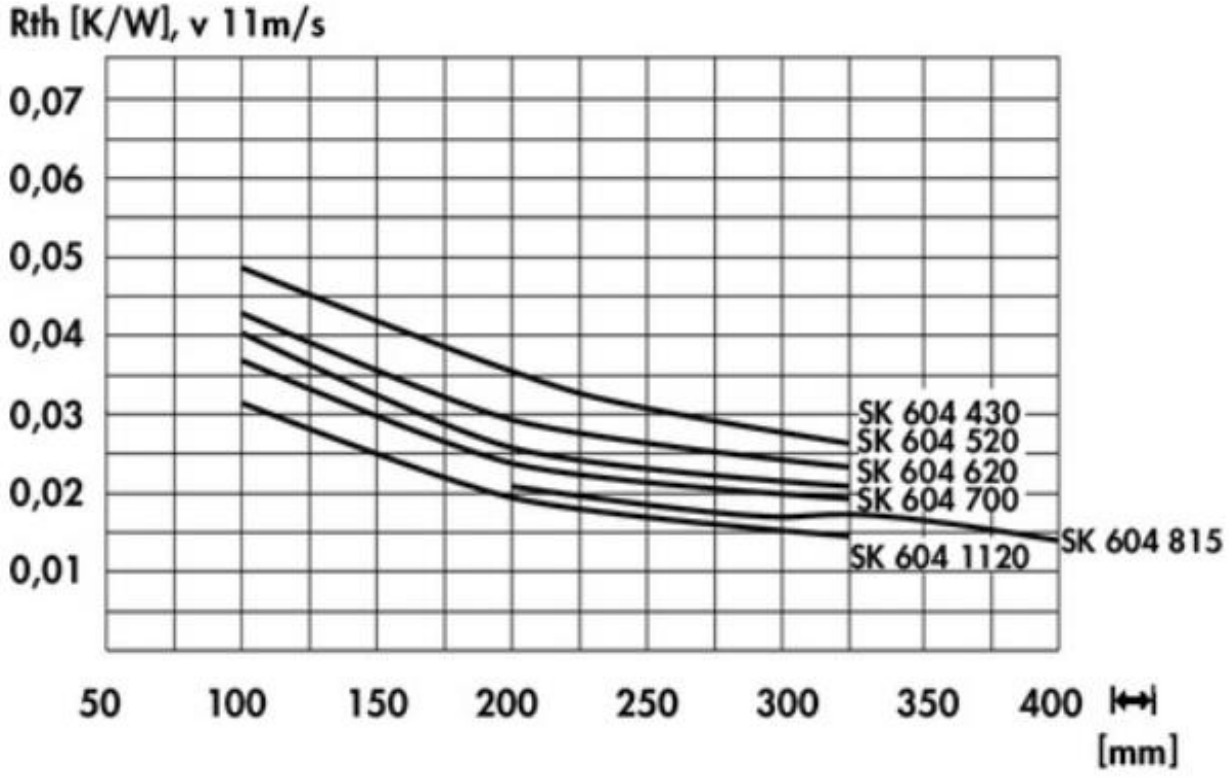
number of fins	32
height	23 mm
length	200 / 300 / 400 / 500 mm
thermal resistance R_{th}	0.048 - 0.014 K/W
surface	• black anodised • natural colour anodised

Technical Drawing



height

A [mm]


Rth [K/W], v 11m/s
0,07
0,06
0,05
0,04
0,03
0,02
0,01
SK 604 430
SK 604 520
SK 604 620
SK 604 700
SK 604 815
SK 604 1120
50
100
150
200
250
300
350
400
[mm]

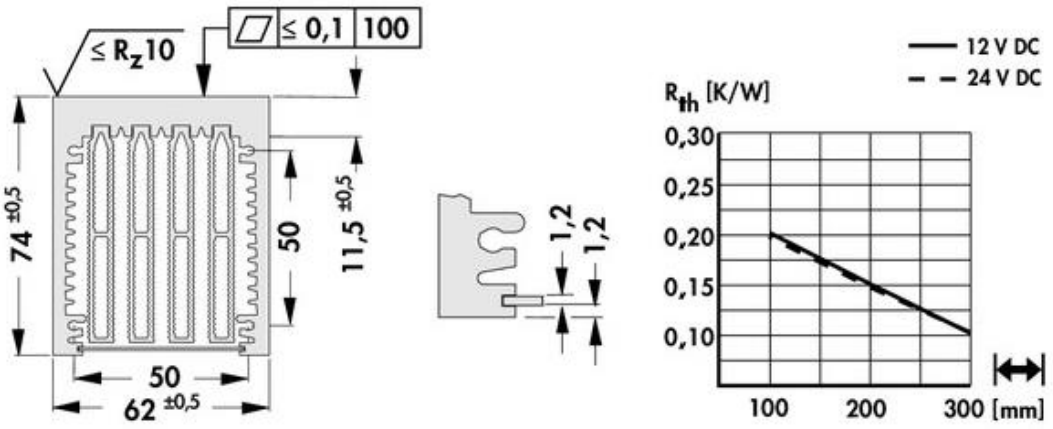
Data sheet Product LA 6

Cooling aggregates > Cooling aggregates with axial fan
62 x 74 mm, with axial fan

Features

width	62 mm
height	74 mm
length	100 / 150 / 200 / 250 / 300 mm
thermal resistance R_{th}	0.2 - 0.1 K/W
surface	• raw degreased aluminium • mounting area(s) milled flat
operating voltage of the fan motor	• 24 V DC • 12 V DC

Technical Drawing



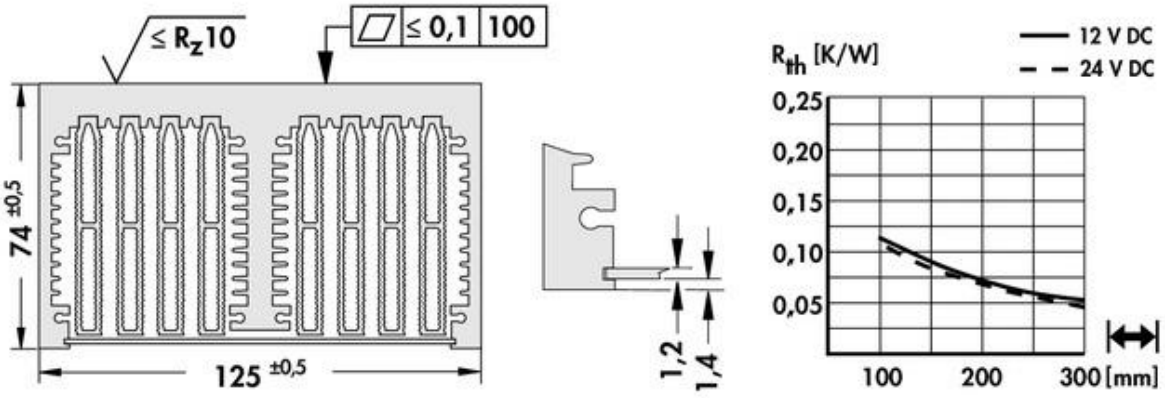
Data sheet Product LA 7

Cooling aggregates > Cooling aggregates with axial fan
125 x 74 mm, with axial fan

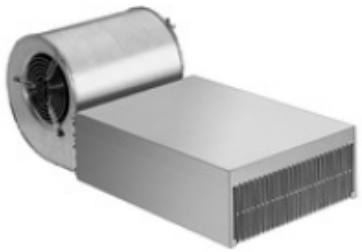
Features

width	125 mm
height	74 mm
length	100 / 150 / 200 / 250 / 300 mm
thermal resistance R_{th}	0.11 - 0.05 K/W
surface	• raw degreased aluminium • mounting area(s) milled flat
operating voltage of the fan motor	• 24 V DC • 12 V DC

Technical Drawing



Data sheet Product LA 20

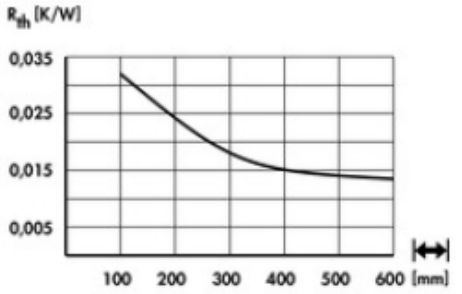


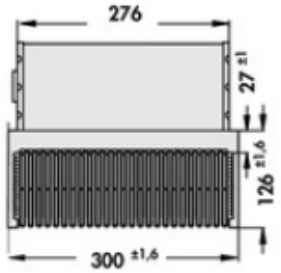
Cooling aggregates > Cooling aggregates with radial fan
300 x 126 mm, with radial fan

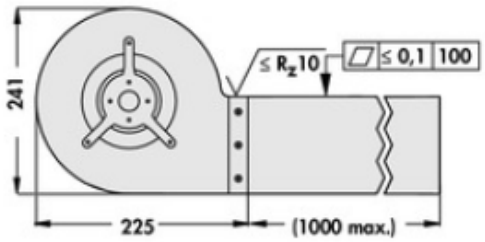
Features

width	300 mm
height	126 mm
length	200 / 300 / 400 / 500 / 600 mm
thermal resistance R_{th}	0.032 - 0.014 K/W
surface	• raw degreased aluminium • mounting area(s) milled flat

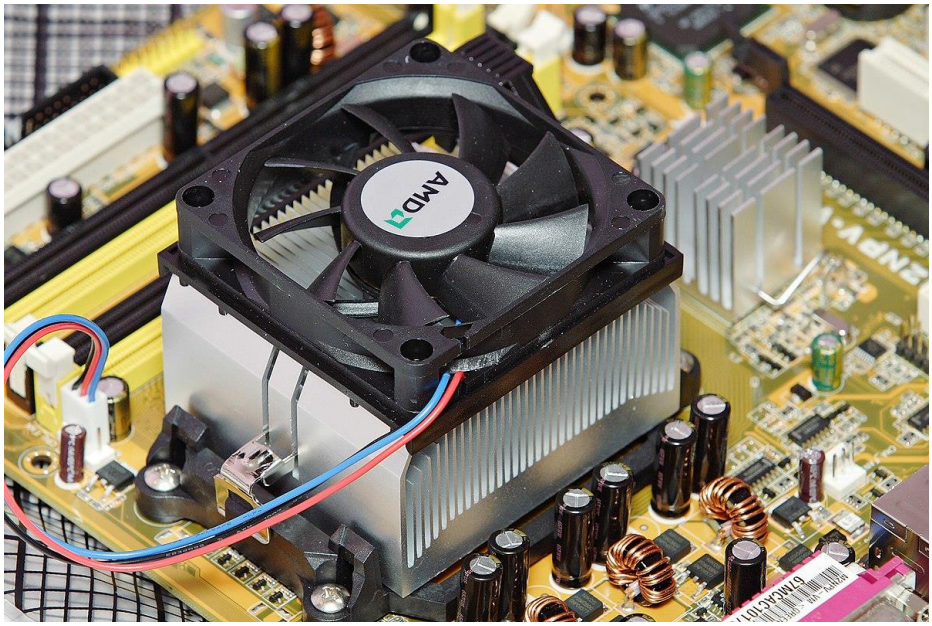
Technical Drawing



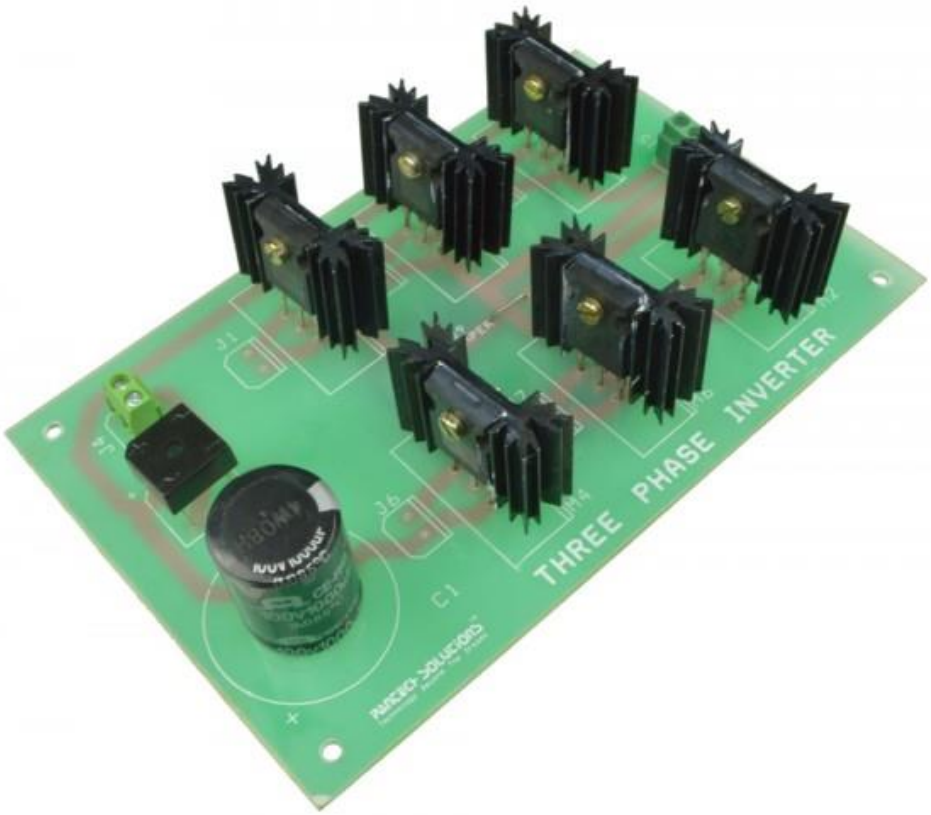




QUESTION ?




U1
LSC
V1
W1
AIRFLOW
U2
MSC
V2
W2


THREE PHASE INVERTER