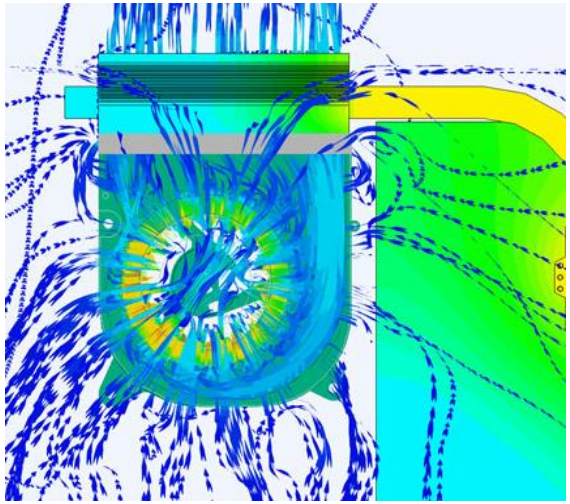
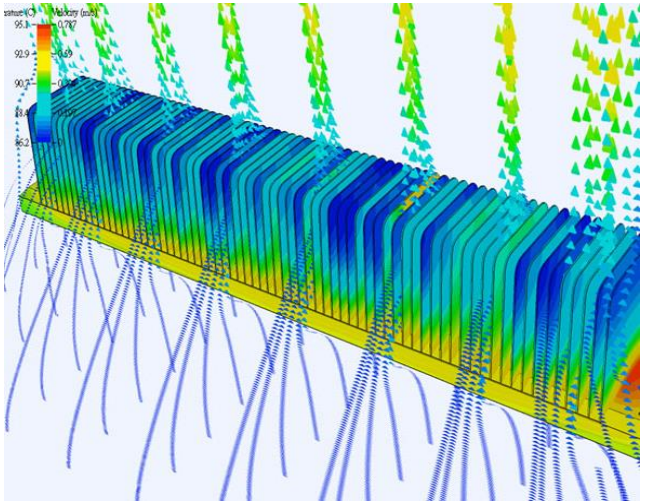
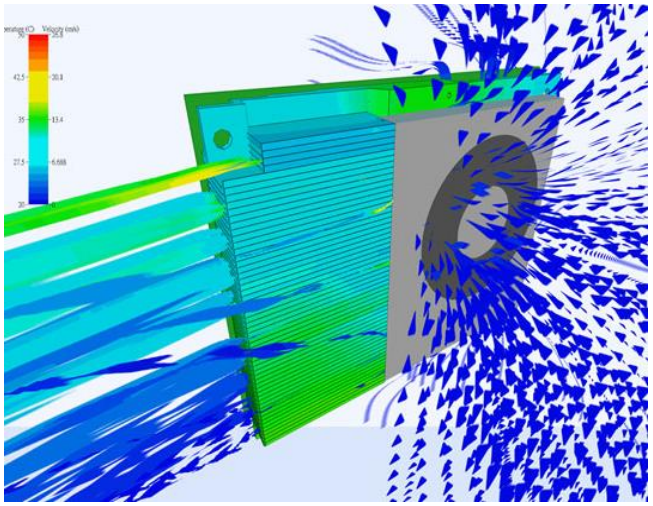
COFAN USA®

Thermal Simulation / CFD & Design



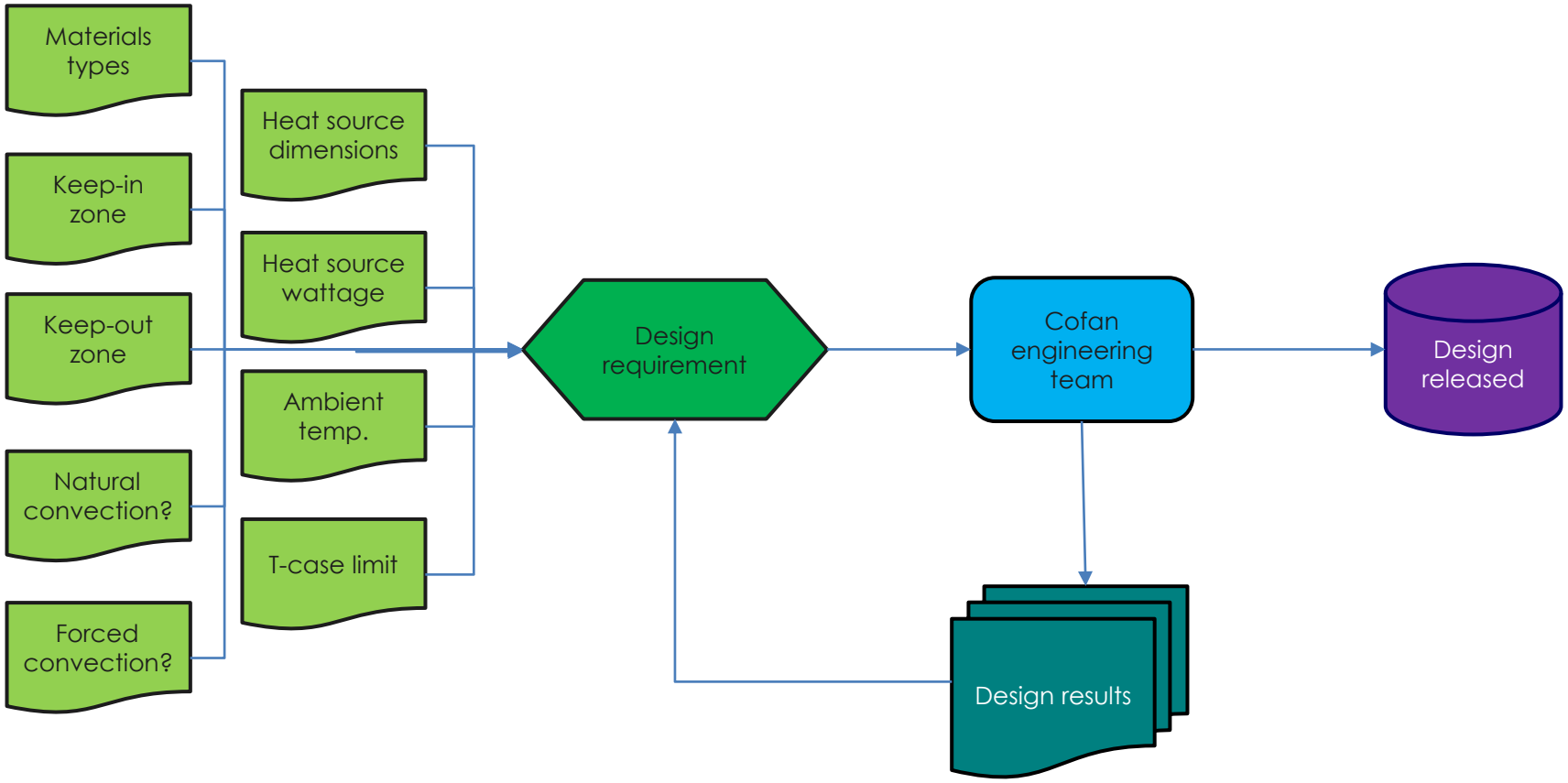




Heat Transfer
Thermal Analysis
Thermal Management

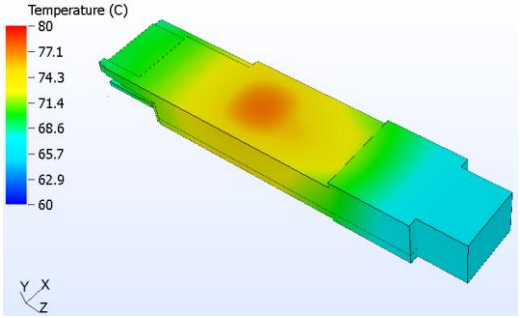
Contents

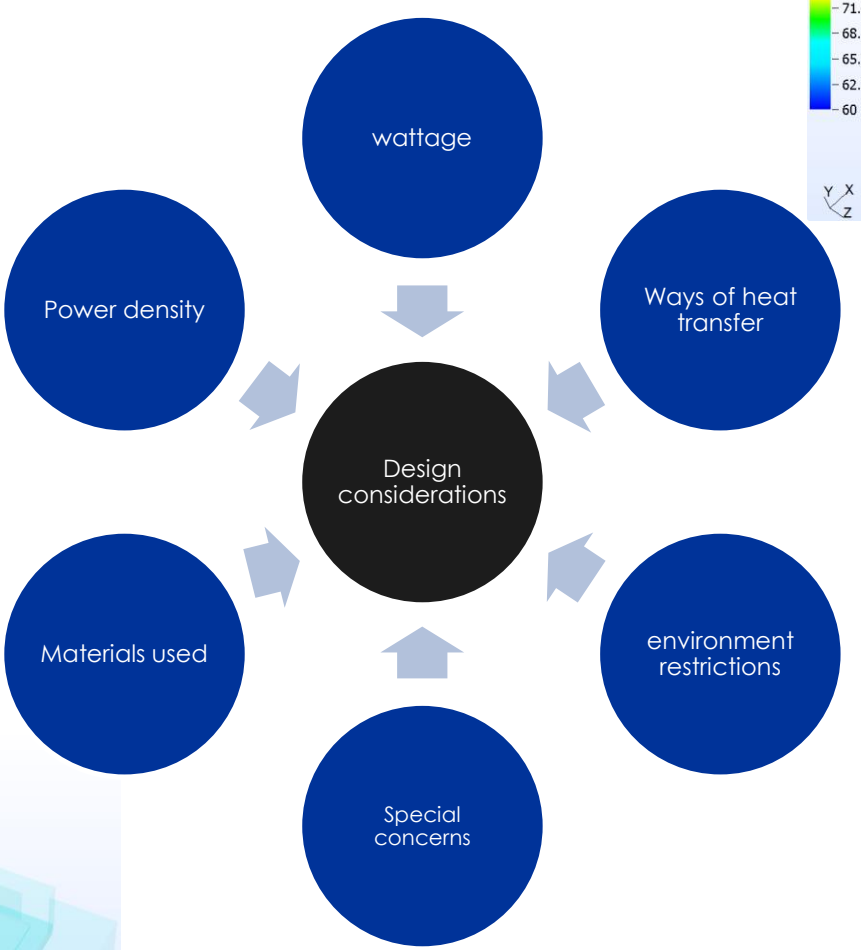
Design Logics

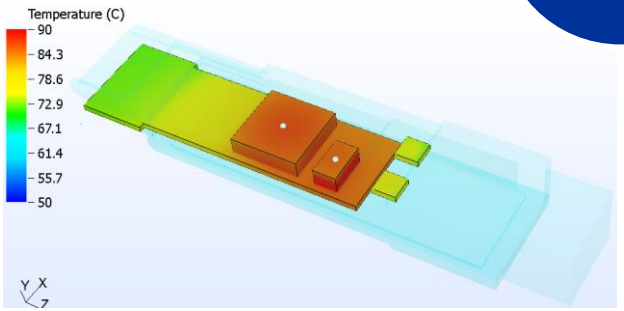


Design Considerations

Simulation Software : 6SigmaET





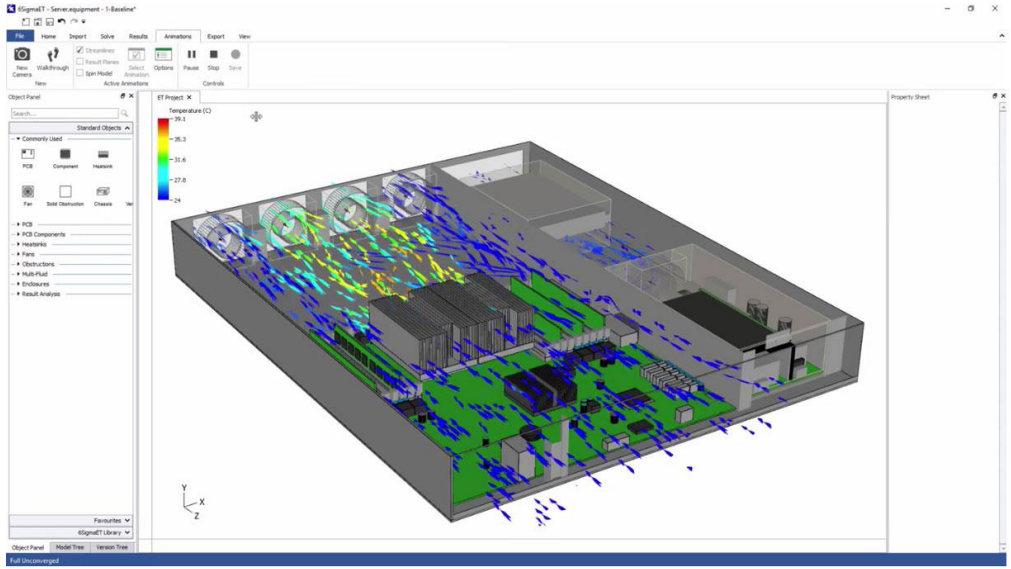


Simulation Software : 6SigmaET

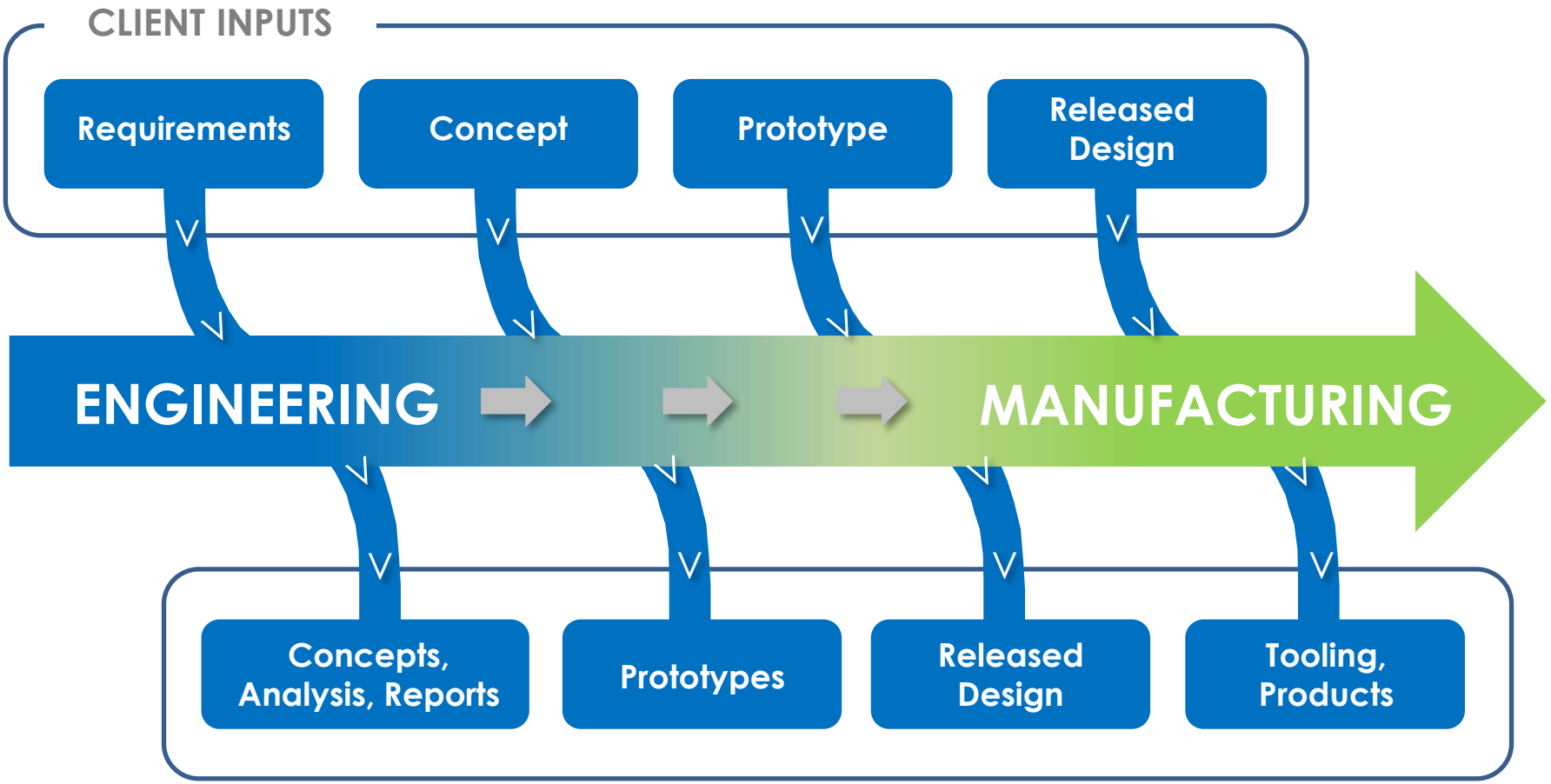
6SigmaET is a thermal modelling tool that uses advanced computational fluid dynamics (CFD) to create accurate models of electronic equipment. Designed specifically for the electronics industry, this software is tailored to meet your requirements and to help you overcome thermal design challenges

Features :

- **Controllers**
- **Component Modeling**
- **PAC Study**
- **PCB Modeling**
- **Altitude**
- **Multi-fluid**
- **Modern User Interface**

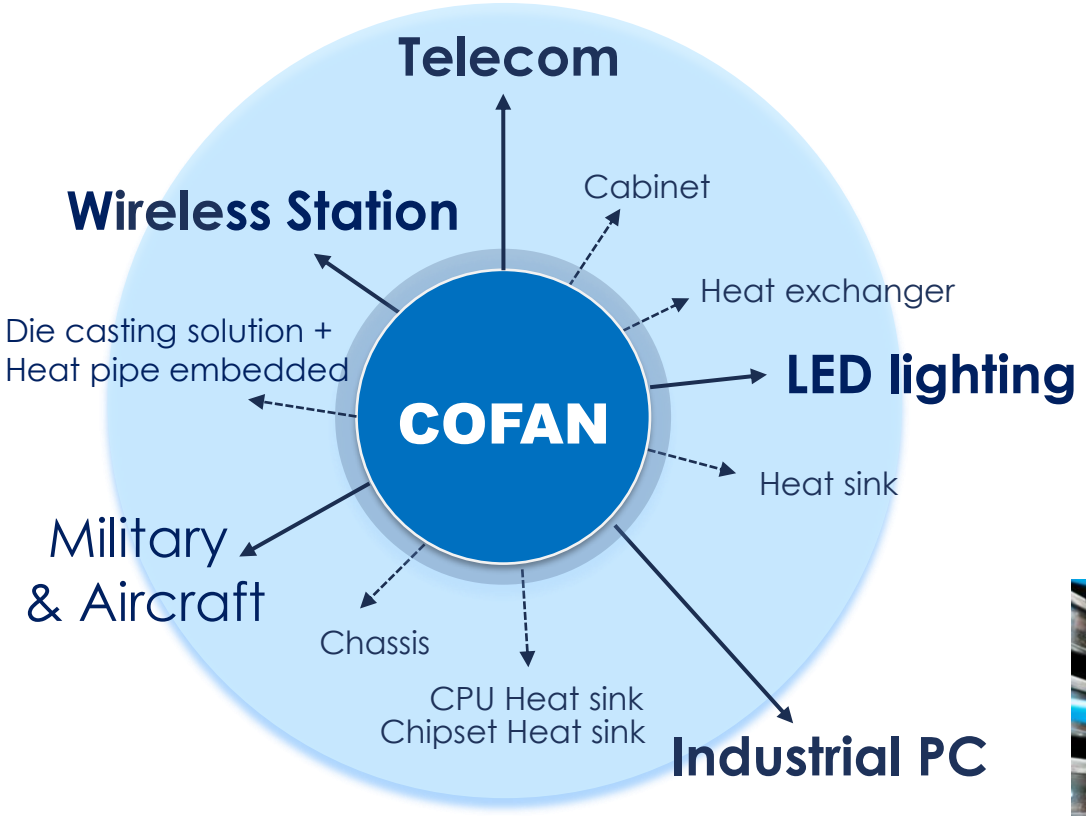


Complete Processes



Applications

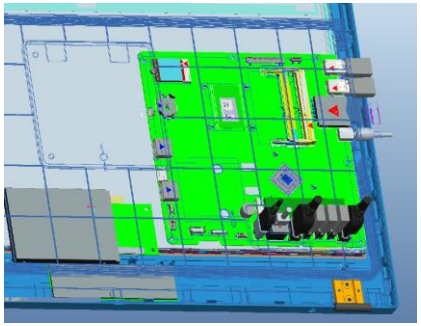
The application of this field include: Telecom, Wireless station, IPC, LED lighting, Military, Aircraft, etc.



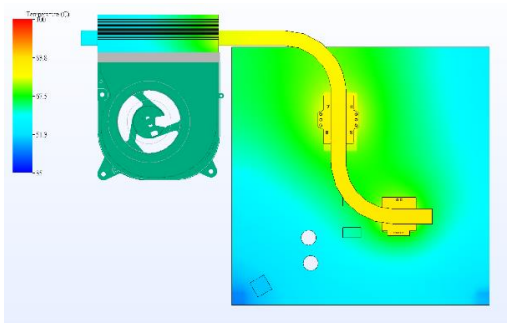
Project A : Thermal Module for AIO system (25W)

Thermal SPEC = 105C @ Tair 35C

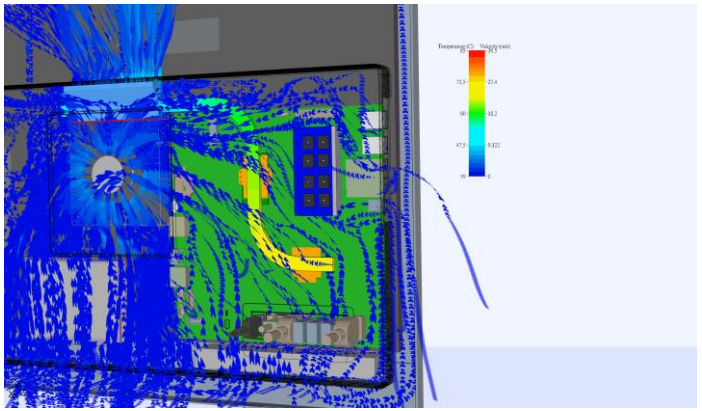
Requirements → **Concept** → **Prototype** → **Released Design to MP**



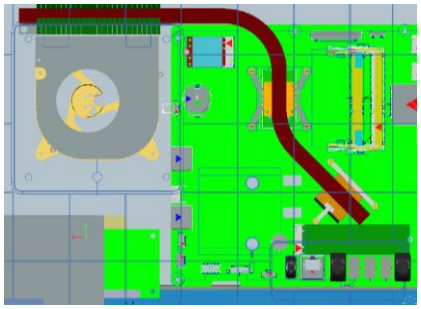
System



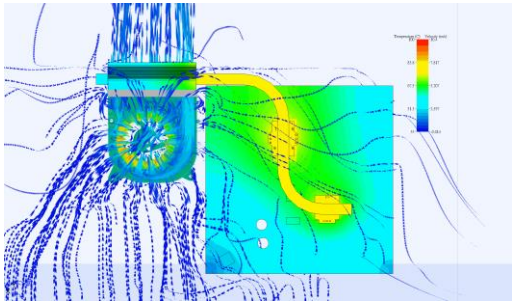
Temperature field
(Tc= 45C @ Tair = 25C)



Flow field (SYS)
Tc= 61C @ Tair = 35C (In sys)



Thermal Module

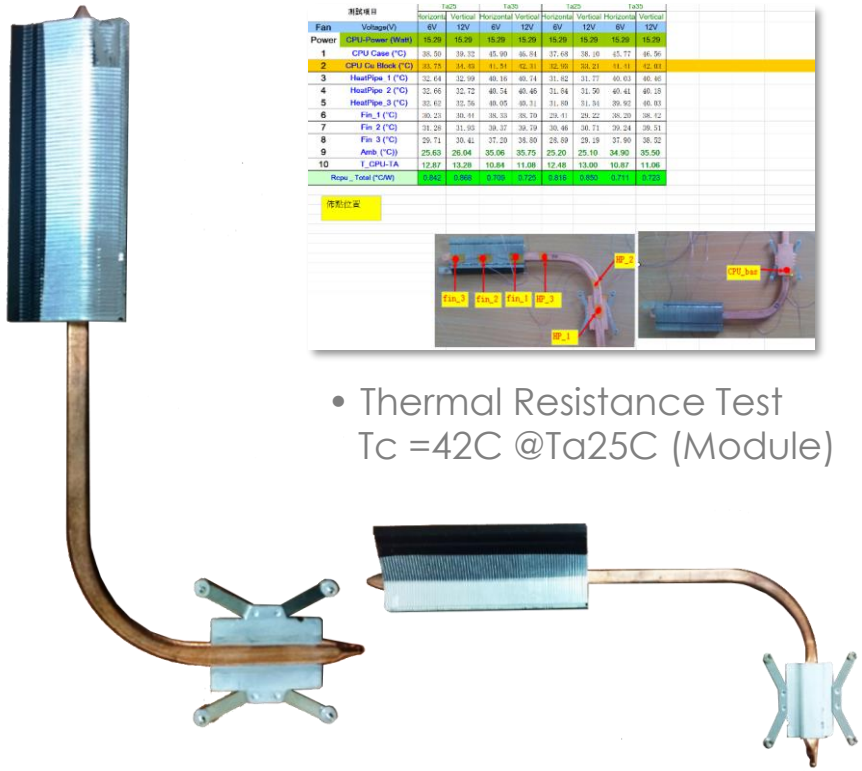


Flow field

Project A : Thermal Module for AIO system (25W)

Thermal SPEC = 105C @ Tair 35C

Requirements → **Concept** → **Prototype** → **Released Design to MP**



Fan	Voltage(V)	Ta25 Horizontal 6V	Ta25 Horizontal 12V	Ta25 Vertical 6V	Ta25 Vertical 12V	Ta35 Horizontal 6V	Ta35 Horizontal 12V	Ta35 Vertical 6V	Ta35 Vertical 12V
Power	CPU-Power (Watt)	15.29	15.29	15.29	15.29	15.29	15.29	15.29	15.29
1	CPU Case (°C)	35.50	39.32	45.90	46.84	37.68	38.10	45.77	46.56
2	CPU Cu Block (°C)	33.75	34.43	41.51	42.31	32.98	33.21	41.41	42.03
3	HeatPipe 1 (°C)	32.64	32.99	40.16	40.74	31.82	31.77	40.03	40.46
4	HeatPipe 2 (°C)	32.66	32.72	40.54	40.46	31.84	31.50	40.41	40.18
5	HeatPipe_3 (°C)	32.62	32.56	40.05	40.31	31.80	31.34	39.92	40.03
6	Fin_1 (°C)	30.23	30.44	38.33	38.79	29.41	29.22	38.29	38.42
7	Fin 2 (°C)	31.26	31.93	39.37	39.79	30.46	30.71	39.24	39.51
8	Fin 3 (°C)	29.71	30.41	37.20	38.80	28.89	29.19	37.90	38.32
9	Amb (°C))	25.63	26.04	35.06	35.75	25.20	25.10	34.90	35.50
10	T_CPU-TA	12.87	13.28	10.84	11.08	12.48	13.00	10.87	11.06
Rcpu_Total (°C/W)		0.842	0.868	0.709	0.725	0.816	0.850	0.711	0.723

- Thermal Resistance Test
  Tc =42C @Ta25C (Module)

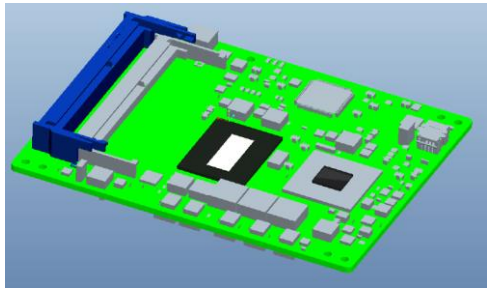
序號	CPU Cubase厚度	CPU壓力值(kg)	GPU壓力值(kg)	壓痕（CPU）	壓痕（VGA）
1	1.5mm	6.648	2.018		
2	1.5mm	6.514	1.956		

- Pressure Test

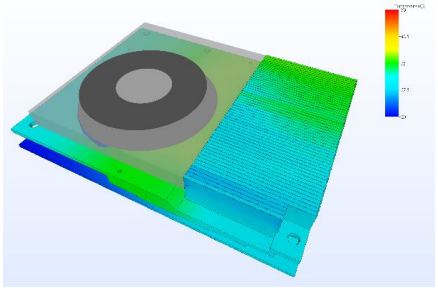
Project B : Thermal Module for IPC(35W)

Thermal SPEC = 98C @ Tair 45C

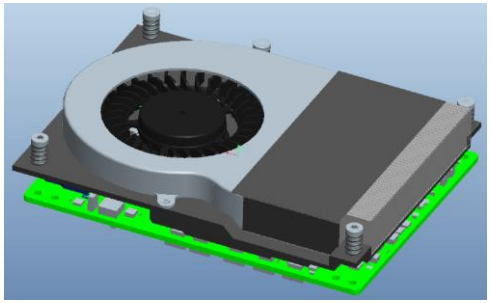
Requirements → **Concept** → **Prototype** → **Released Design to MP**



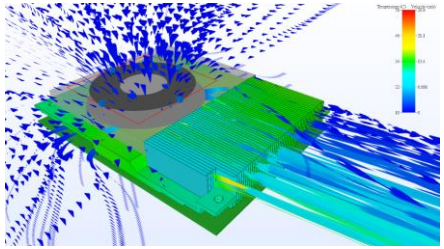
PCB



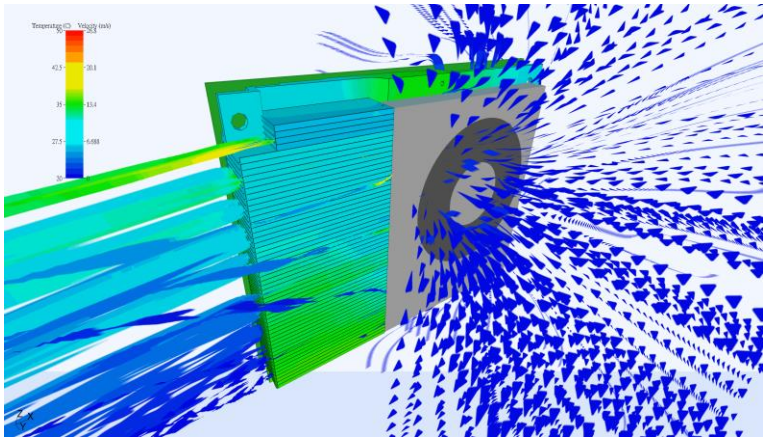
Temperature field



Thermal Module



Flow field

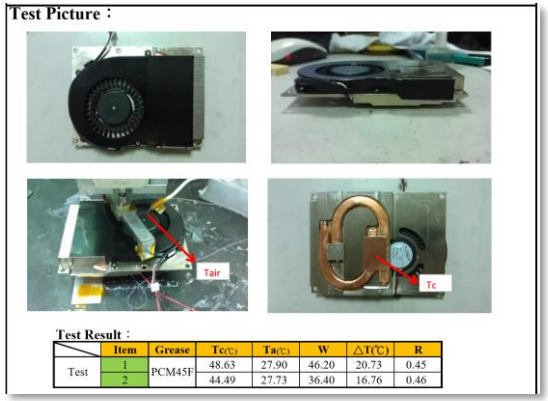


Flow field
Tc= 70C , Tair = 45C

Project B : Thermal Module for IPC(35W)

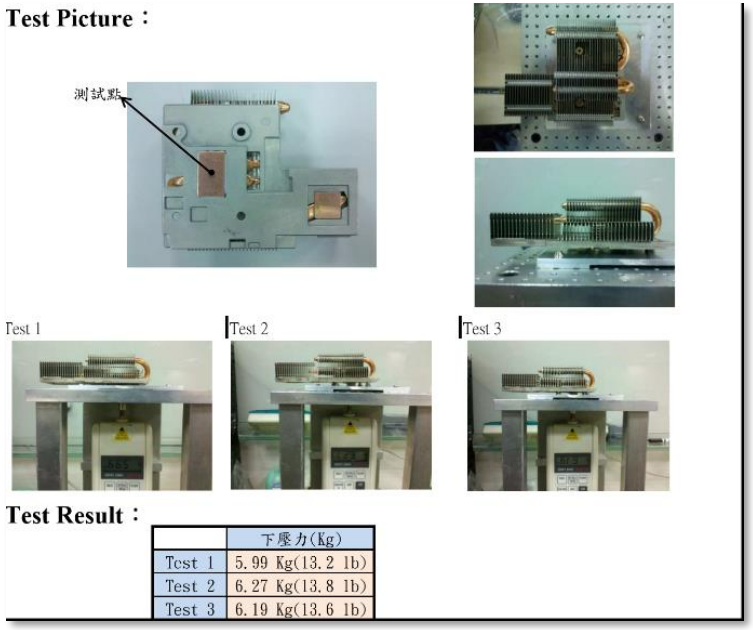
Thermal SPEC = 98C @ Tair 45C

Requirements → **Concept** → **Prototype** → **Released Design to MP**



	Item	Grease	Tc(℃)	Ta(℃)	W	△T(℃)	R
Test	1	PCM45F	48.63	27.90	46.20	20.73	0.45
	2		44.49	27.73	36.40	16.76	0.46

- Thermal Resistance Test (Tc =48.6C @Ta25C)



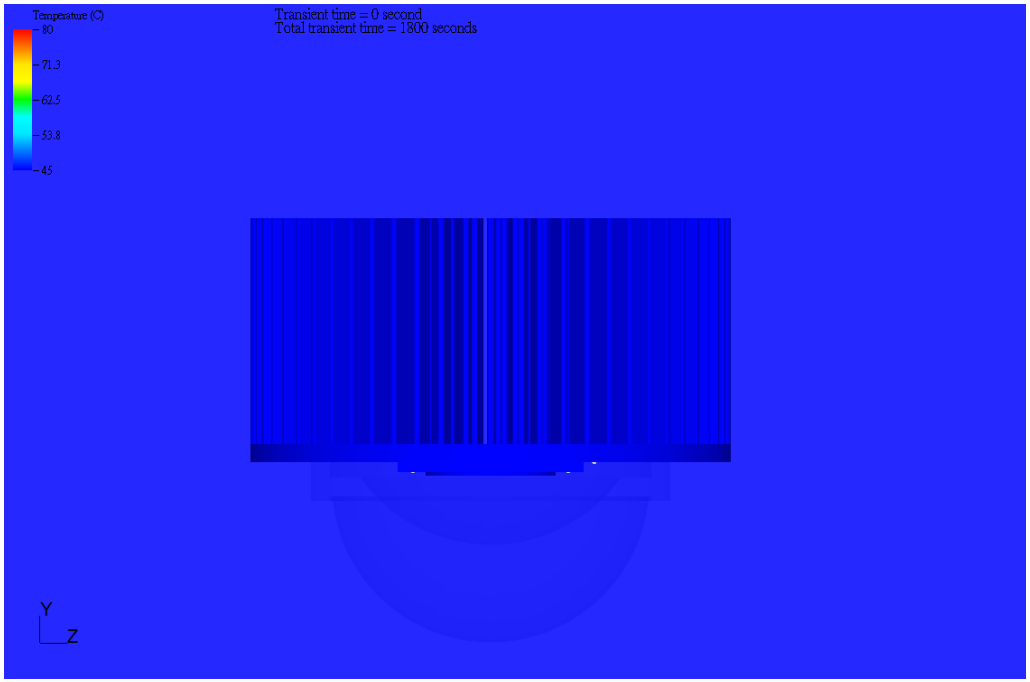
	下壓力(Kg)
Test 1	5.99 Kg(13.2 lb)
Test 2	6.27 Kg(13.8 lb)
Test 3	6.19 Kg(13.6 lb)

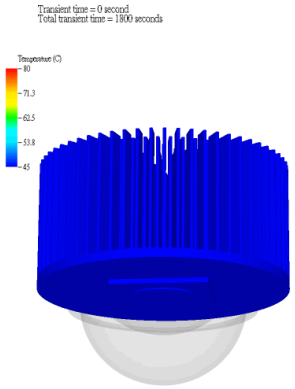
- Pressure Test

Project C : Thermal Module for LED(35W)

Thermal SPEC = 85C @ Tair 45C

Requirements → Concept → Prototype → Released Design to MP



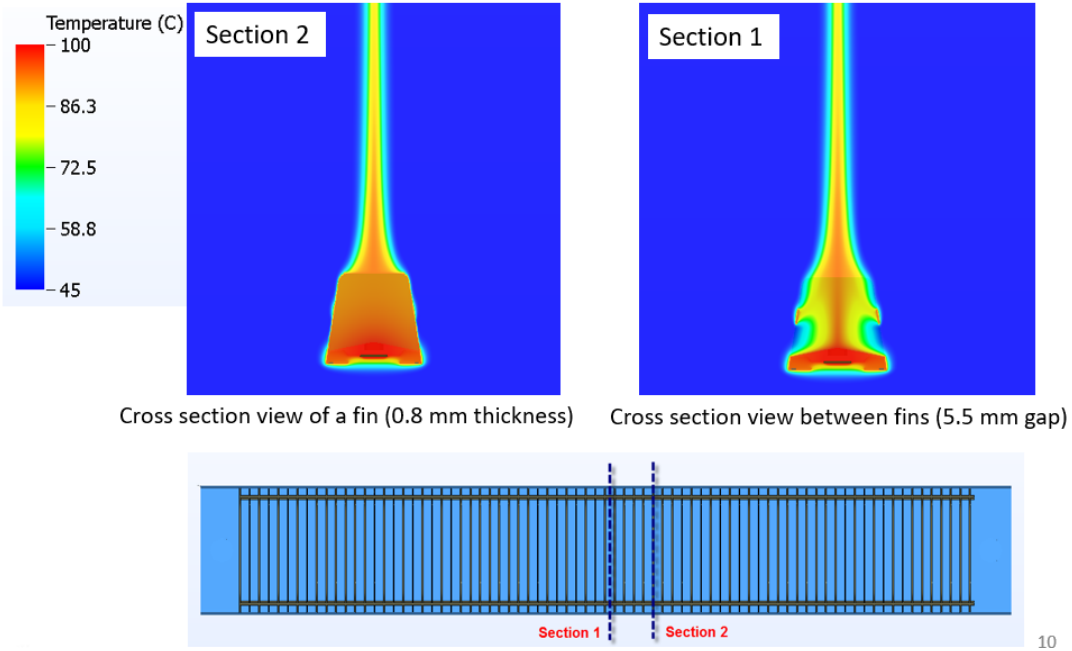


Tc= 81.2C , Tair = 45C

Project D : Thermal Module for LED Lightbar(320W)

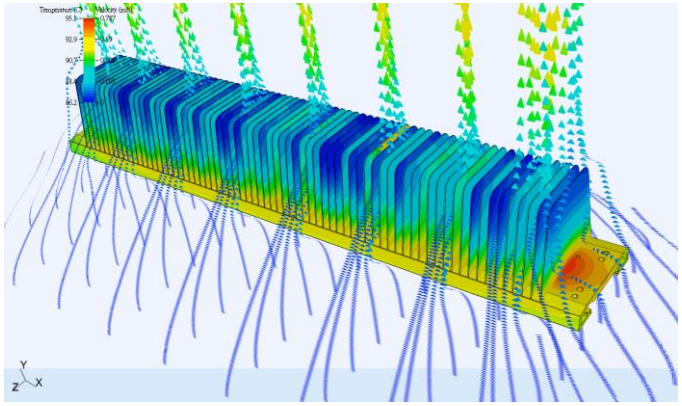
Thermal SPEC = 85C @ Tair 45C

Requirements → Concept → Prototype → Released Design to MP



Cross section view of a fin (0.8 mm thickness)

Cross section view between fins (5.5 mm gap)

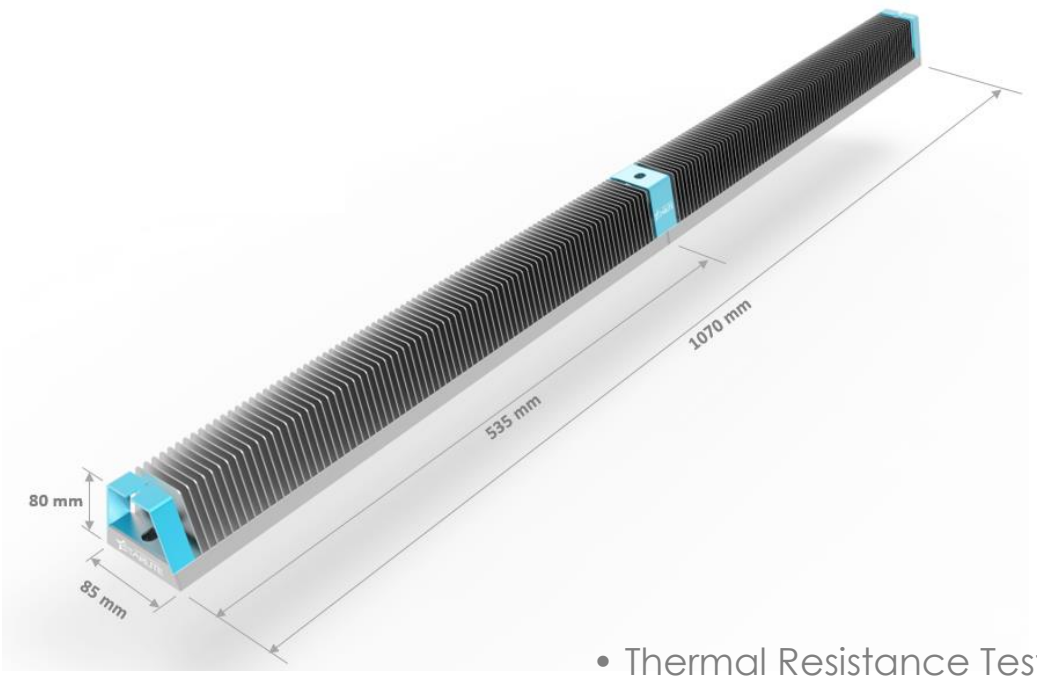


Tc= 81.2C , Tair = 45C

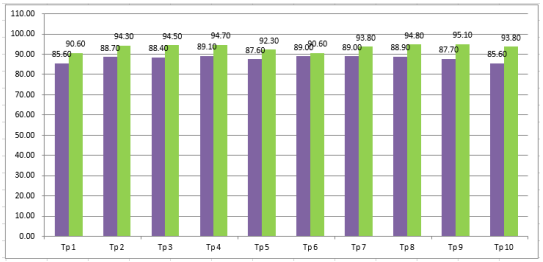
Project E : Thermal Module for LED Lightbar(640W)

Thermal SPEC = 100C @ Tair 45C

Requirements → **Concept** → **Prototype** → **Released Design to MP**



ITEM	Insert Fin (Downward)		Insert Fin (Upward)	
	Measure	TA45 offset	Measure	TA45 offset
PWR(W)	657.00		665.00	
TA	31.90	45.00	32.40	45.00
Tp 1	72.50	85.60	78.00	90.60
Tp 2	75.60	88.70	81.70	94.30
Tp 3	75.30	88.40	81.90	94.50
Tp 4	76.00	89.10	82.10	94.70
Tp 5	74.50	87.60	79.70	92.30
Tp 6	75.90	89.00	78.00	90.60
Tp 7	75.90	89.00	81.20	93.80
Tp 8	75.80	88.90	82.20	94.80
Tp 9	74.60	87.70	82.50	95.10
Tp 10	72.50	85.60	81.20	93.80
Base 1	71.60	84.70	77.00	89.60
Base 2	74.90	88.00	81.40	94.00
Base 3	74.00	87.10	80.00	92.60
Base 4	75.10	88.20	81.20	93.80
Base 5	74.80	87.90	81.60	94.20
Base 6	71.30	84.40	76.10	88.70
Wire 1	68.10	81.20	72.80	85.40
Wire 2	67.70	80.80	72.40	85.00
Wire 3	68.20	81.30	71.60	84.20
Wire 4	68.80	81.90	72.10	84.70

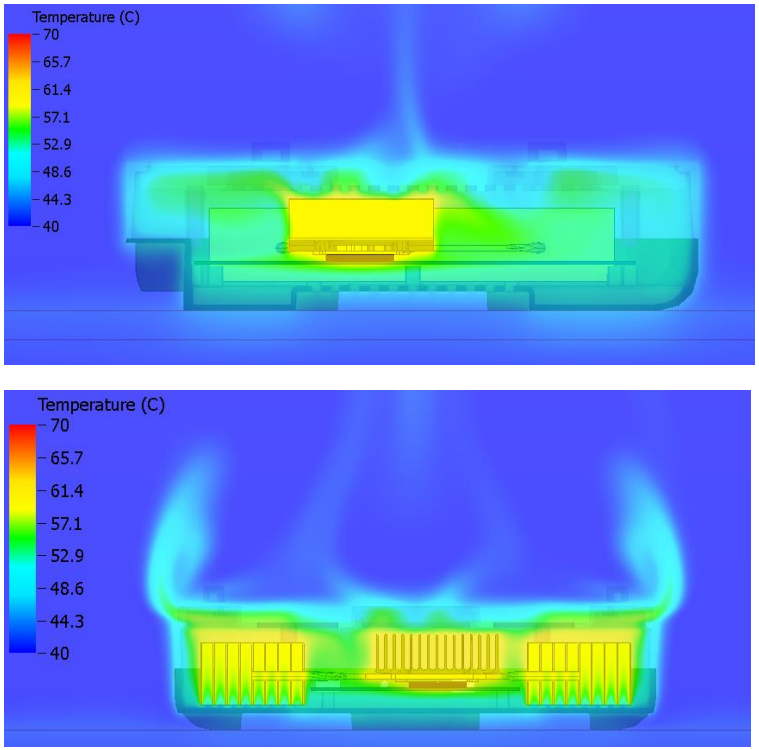


- Thermal Resistance Test (Tc =94C @Ta45C)

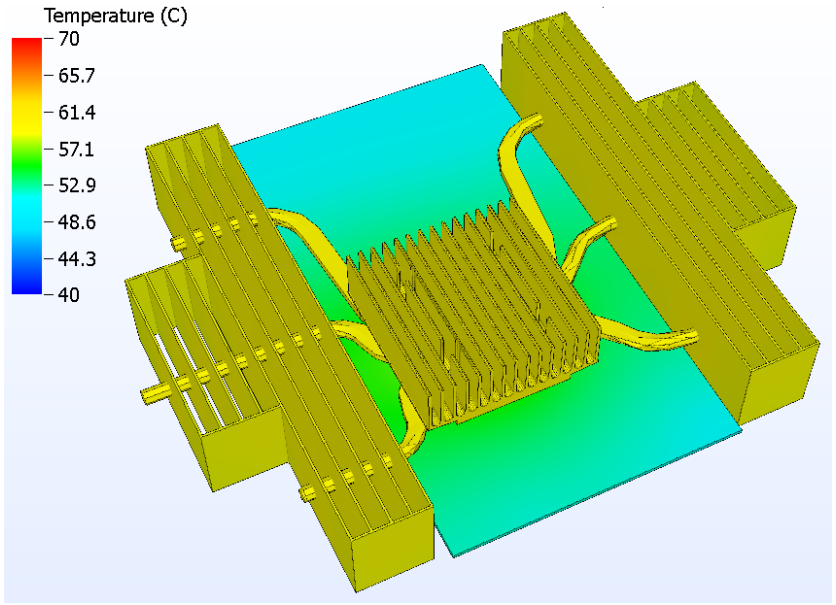
Project F : Thermal Module for WiFi radio device(15W)

Thermal SPEC = 70C @ Tair 40C

Requirements → Concept → Prototype → Released Design to MP



Temperature field



Temperature field
Tc= 63.3C , Tair = 40C

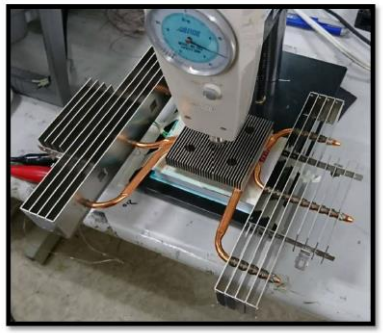
Project F : Thermal Module for WiFi radio device(15W)

Thermal SPEC = 70C @ Tair 40C

Requirements → **Concept** → **Prototype** → **Released Design to MP**

- Thermal Resistance Test (Tc =54.0C @Ta40C)

Test Picture :



Test Result :

	Grease	V	A	W	Ta(℃)	Tc(℃)	△T(℃)	R
Sample 1	TPCM-585	12.1	1.25	15.13	29.50	43.10	13.60	0.90
Sample 2		12.1	1.25	15.13	31.40	45.40	14.00	0.93
Sample 3		12.1	1.25	15.13	31.60	45.50	13.90	0.92
Sample 4		12.1	1.25	15.13	30.40	44.20	13.80	0.91
Sample 5		12.1	1.25	15.13	30.30	44.40	14.10	0.93

Offset Ta=40 :

	Grease	V	A	W	Ta(℃)	Tc(℃)	△T(℃)	R
Sample 1	TPCM-585	12.1	1.25	15.13	40.00	53.60	13.60	0.90
Sample 2		12.1	1.25	15.13	40.00	54.00	14.00	0.93
Sample 3		12.1	1.25	15.13	40.00	53.90	13.90	0.92
Sample 4		12.1	1.25	15.13	40.00	53.80	13.80	0.91
Sample 5		12.1	1.25	15.13	40.00	54.10	14.10	0.93

THANK YOU

COFAN USA®

Meeting Your Project Needs