LongWin
Since 1985

Professional Design & Manufacture of Inspection & Research Equipments for IT, Semi-conductor, Automobile and Air-conditioner industries

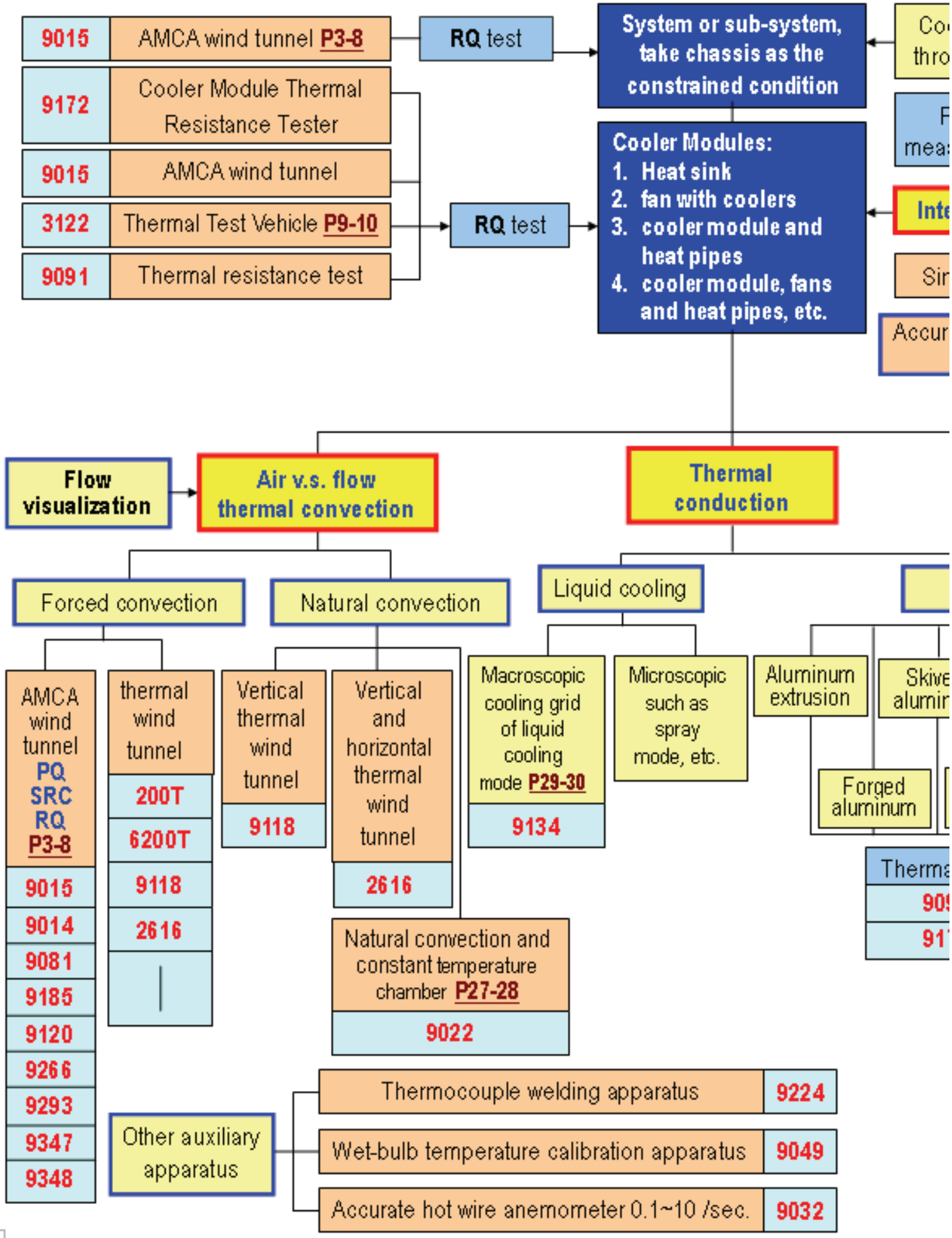
Professional Design and Manufacture Various of

- Solid, Fluid, and Thermal Mechanics - Research Equipments

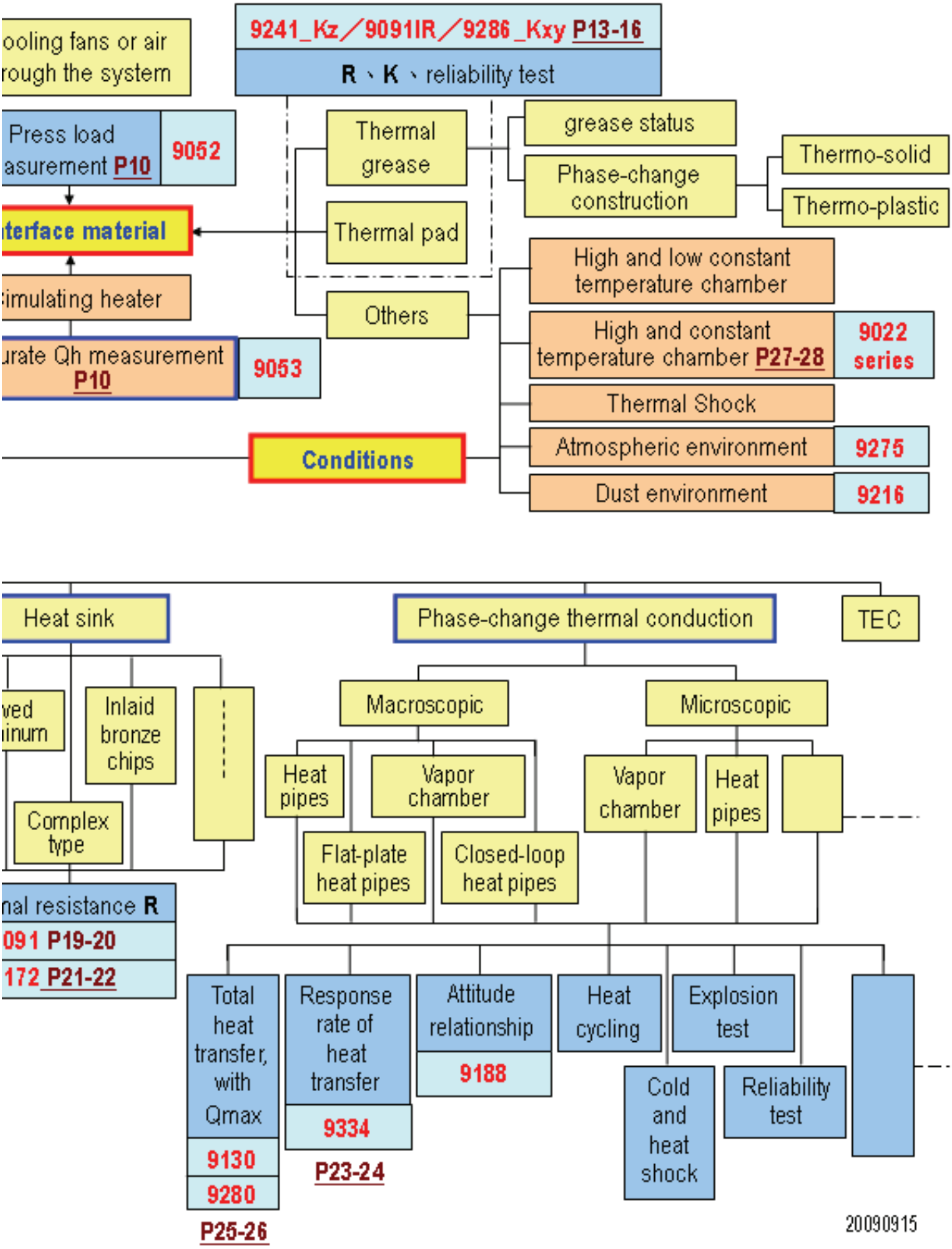
- High Speed Impact Testers
- Wind and Water Tunnels
- TIM Thermal Resistance and Conductivity Measurement Apparatus
- Cooler Module Thermal Resistance Measurement Apparatus
- AMCA 210-99 Wind Tunnel Series – Fan PQ Performance Test
- LED Thermal Performance Testers
- Phase-change Component Thermal Conductivity Measurement
  - Heat Pipes, Vapor Chambers, Closed-loop Heat Pipes

No.012 / 20091005

Thermal Flow Chart for IT



Thermal Solution Products



About Us

Long Win Science and Technology Corporation was established in 1985. Since then, we have much experience in thermal & flow, fluid mechanics, material, and auto control fields. Moreover, our task is to design and manufacture high-quality apparatus based on professional knowledge and technology of physics and mechanics.

To expect ourselves as a **F**undamental, **F**orward, and the **F**irst institute of research and development center (**3F**_IRDC), we own a laboratory with the area of 2000 m^2 in 2009. Over 100 kinds of self-developing research instruments about thermal & flow, fluid mechanics, condition test and solid mechanics are demonstrated in our lab. Besides, we also customize research and test equipments in the thermal & flow field to meet clients' need.

All products' researching, designing, manufacturing, assembling and testing procedures are executed in Long Win. Our worldwide marketing instruments not only meet international standards, but also are recognized by the third party accredited laboratory for quality certification to provide professional and reliable services.

At present, our products are provided for IT, semi-conductor, automobile, air-condition, LED industries all over the world. In 2009, Long Win share the most market rate of thermal & flow research apparatus in IT industry, and play a very important role.

The main product series of Long Win include:

Thermal and flow test apparatus:

- AMCA 210-99 Wind Tunnel Series
- Thermal Wind Tunnel
- TIM Thermal Resistance and Conductivity Measurement Apparatus
- LED Thermal Performance Tester
- Cooler Module Thermal Resistance Measurement Apparatus
- Heat Pipe Thermal Resistance and Qmax Measurement Apparatus
- Natural Convection Constant Temperature and Humidity Chamber

Fluid mechanics research apparatus:

- Wind Tunnels
- Water Tunnels
- Water Tanks
- Flow Visualization Apparatus
- Meet NACA series air foil models
- Educational Facilities
  - Venturi Tube-Bernoulli's Equation Apparatus
  - Pipe Line Pressure Loss Apparatus
  - Forced Convection Heat Transfer Apparatus / Cooler Module for IT Industry
  - Fan PQ Performance Apparatus
  - Air Flow Rate Measurement Apparatus
    -orifice, venturi, nozzle and flow meter
  - Helle-shaw Flow Visualization Apparatus
  - Natural and Forced Convection Heat Transfer Apparatus
  - Educational Wind Tunnel
  - Horizontal Wind Tunnel
  - Open and Horizontal Wind Tunnel
  - Heat Pipe Thermal Performance Measurement Apparatus

Solid mechanics research apparatus:

- High Speed Impact Testers
- Split Hopkinson Compression Bar Tester
- Split Hopkinson Torsion Bar Tester
- Split Hopkinson Tension Bar Tester

We have more instruments for basic physical parameter measurement and property observation. Welcome to visit and communicate with us.

9015 series - Auto Fan Performance Testing Apparatus

AMCA wind tunnel is the most important tool for testing fan performance. Long Win have much experience of this field for fifteen years to develop 7th generation of AMCA wind tunnel. Functions include: automatic measurement and nozzle switch; available both inlet and outlet setup and STP conversion. It is not only for fan performance testing, but also for the impedance and thermal test of systems, modules and components.

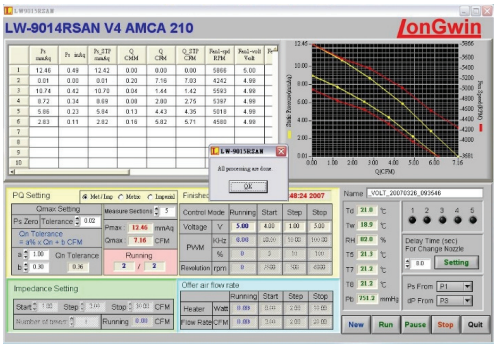
The new generation provides properties of multi-function and high-efficiency to assist you having more smooth development and better design, manufacture, and QC quality.

Features

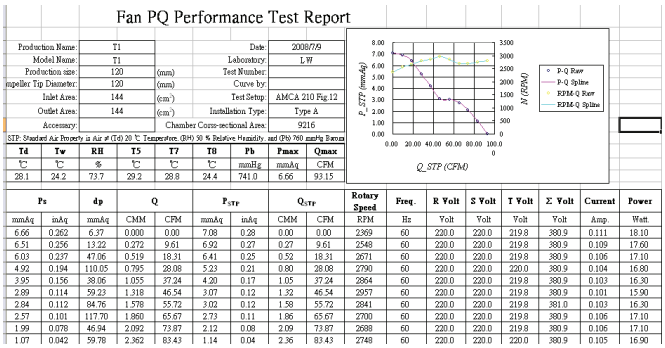
- Follow AMCA 210 standard for the body structure and nozzles.
- Suitable for PQ test of AC/DC fans, system impedance test. Auto PC-based control with high efficiency and repeatability >98.5%
- Three modes for PQ test: constant voltage, constant RPM and PWM. Combining both Fig. 12 (outlet type) and 15 (inlet type).
- Can be a standard flow rate generator, and measure R-Q curve (resistance and flow rate) with thermal wind tunnel.
- Automatic STP conversion.
- Results are output as Excel format report files and plotted automatically to save data processing time.
- 100% with calibration reports of NML, Taiwan before delivery.

Nozzles meeting AMCA 210-99 standard

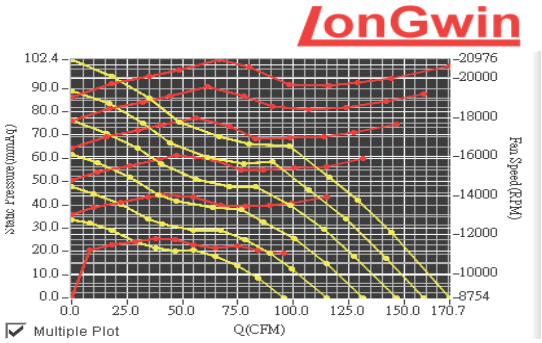
Applications



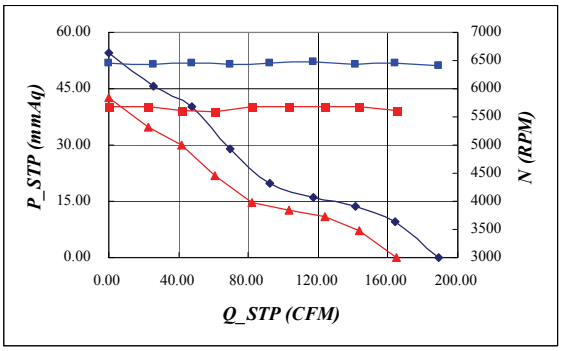
The software is developed through Lab Windows: Easy to operate, real-time PQ curve, and select plotting data with equal gap automatically.



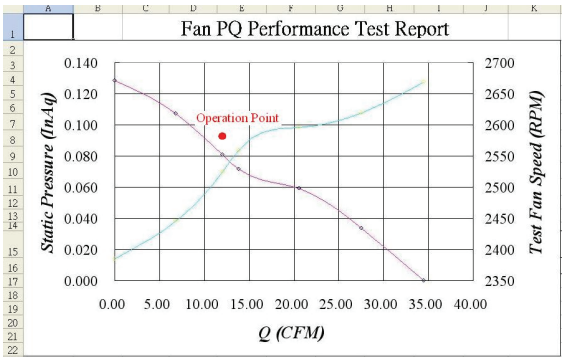
Output as Excel files with figures. Parameters are temperature, humidity, atmospheric pressure for local PQ values and PQ of standard condition, electrical properties and efficiency of fans and uncertainty %.



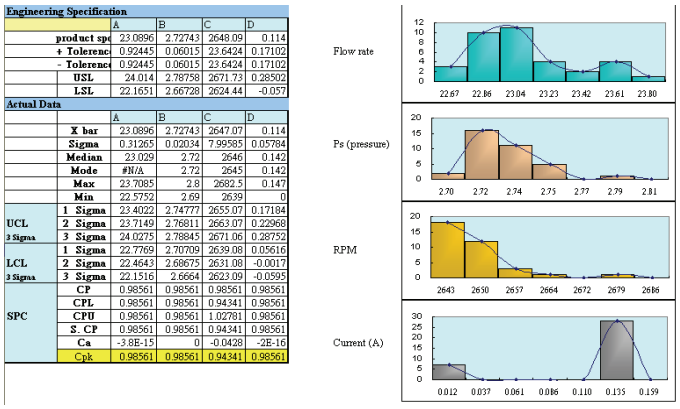
Output voltage of PSU can be controlled by PC. Software can record PQ curves under different voltages spontaneously.



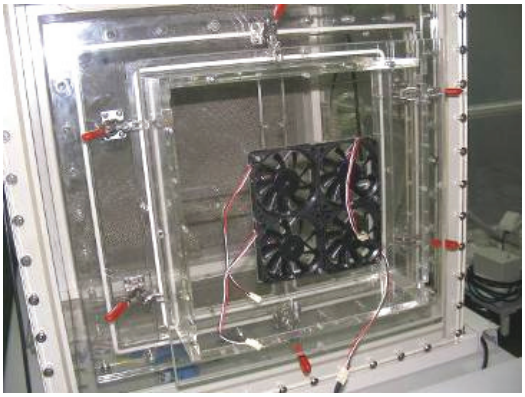
Test in constant RPM mode. RPM can be controlled by voltage or PWM.



Inspection of fan operation check point. The software will judge the fan pass the examination or not.

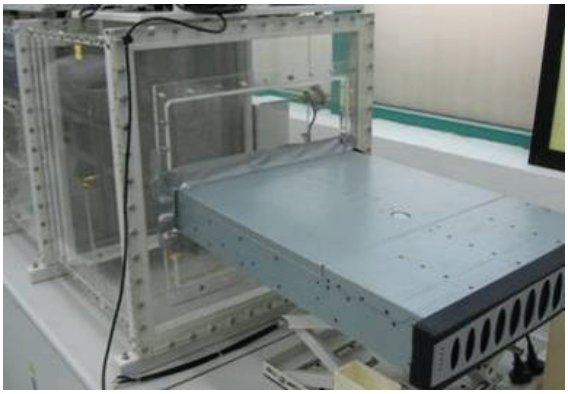


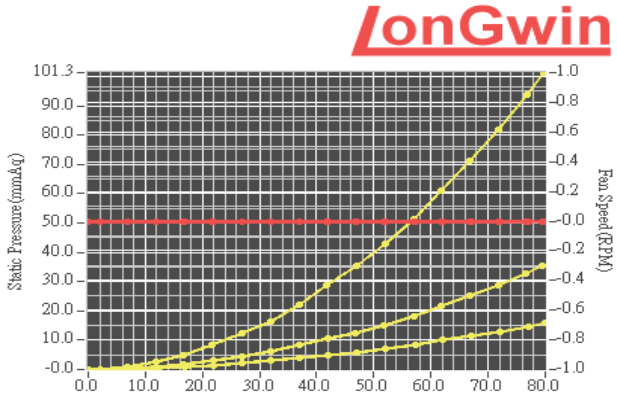
Applicable to Cpk analysis as doing quality control statistics of fan manufacture process.



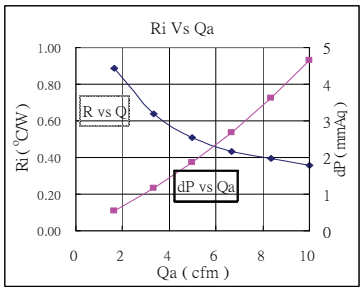
P_{STP}	Q_{STP}	Fan-Speed	Fan-Volt	Fan-Amp	Volt2	AMP2	RPM2
mmAq	CFM	RPM	Volt	Amp			
40.11	0.00	31867	11.99	0.671	12.06	0.44	29891
37.28	2.20	32576	12.00	0.639	12.06	0.43	29921
35.92	4.73	31325	12.00	0.615	12.06	0.45	28784
35.53	6.58	30526	12.00	0.599	12.05	0.47	27532
35.04	9.18	32658	11.99	0.647	12.04	0.49	26762
34.94	11.21	32643	11.99	0.656	12.04	0.50	26028
33.09	13.64	32261	11.99	0.663	12.03	0.51	25123
35.04	15.51	31269	11.99	0.671	12.02	0.52	24498
30.55	17.71	30666	11.99	0.695	12.02	0.53	24220
23.42	19.90	30501	11.99	0.690	12.02	0.53	23897
13.96	22.60	30566	11.99	0.689	12.02	0.54	23531
6.54	24.66	30288	11.99	0.691	12.02	0.55	23348
0.04	26.93	30825	11.99	0.692	12.02	0.55	23178

Connect multi-fans in the serial or parallel way to record voltage, amp and RPM for each fan.

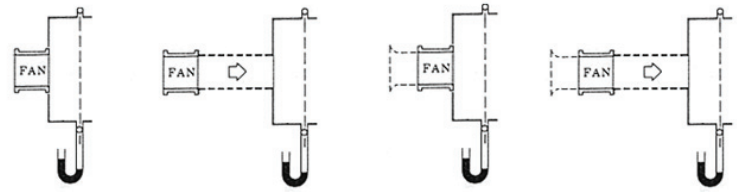




Applicable to system impedance measurement of PC, Notebook, and server.



Analyze thermal resistance and the relationship between pressure drop and flow rate by collocation thermal wind tunnel or standard Intel thermal testing vehicle. During testing, the user set up the flow rate, heating power only. PC will control the other procedures. Results are output as Excel format report files and plotted automatically to save much data processing time.

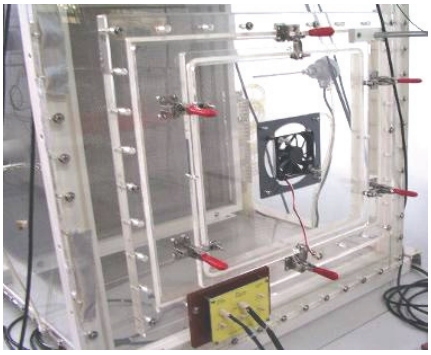


Type A
Free Inlet,
Free Outlet

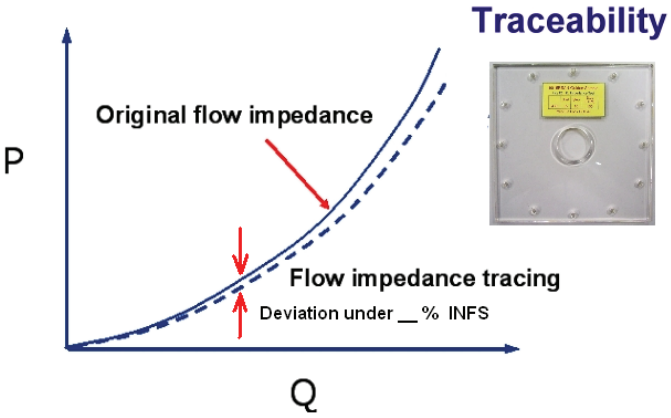
Type B
Free Inlet,
Ducted Outlet

Type C
Ducted Inlet,
Free Outlet

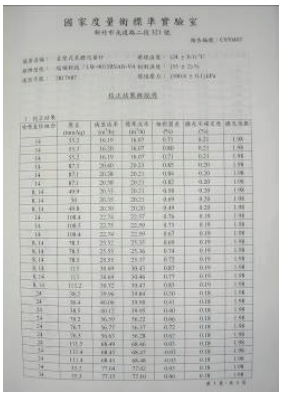
Type D
Ducted Inlet,
Ducted Outlet

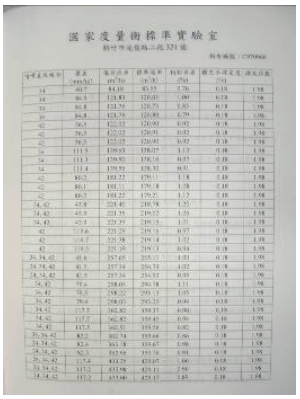


Different mounting of fans will lead to different outcome.
Long Win provids standard fan testing plate (type A)



Offer standard orifice plate for system impedance test.
It is also a reference for self tracing calibration.





Before delivery, all products are calibrated each nozzle through 3 different standard flow rates by NML, Taiwan. to ensure accuracy for measurement.

Standard models

LW-9014/9081

LW-9015

LW-9185

LW-9120

LW-9293

LW-9347

LW-9266

LW-9348

Specifications

Models		**9014**	**9081**	**9015**	**9185**	**9120**	**9293**	**9347**	**9266**	**9348**
Follow standard of		AMCA 210-99						AMCA 210-99		
Wind tunnel types		Fig.12&Fig.15						Fig.12		
Flow Rate (CFM) (1)		0.2-10	1.6-60	2.4-250	2.9-800	100-3000	230-21300	0.2-18	2.4-250	4-1000
Static pressure (mmAq) (2)		0-30	0-30	0-30	0-30	0-20	0-20	0-20	0-20	0-20
Max. open window for testing fans (cm)		8×8	8×8	30×30	30×30	60×60	100×100	8×8	24×24	40×40
Auto PC-based control		included								
Data acquisition sys.		included								
High static pressure fan test throttle device		optional	optional	optional	optional	optional	--	--	optional	optional
Multi-fan test device		optional	optional	optional	optional	optional	--	optional	optional	optional
Dimension (cm)	Length	250	300	360	460	800	1200	160	220	260
	Width	60	60	85	180	260	350	60	70	80
	Height	160	160	180	190	230	260	140	160	190
Weight (kg)		370	550	750	1500	2800	9000	380	400	550
Power source		1φ 220V 5A	1φ 220V 5A	1φ 220V 5A	3φ 220V 20A	3φ 220V 40A	3φ 380V 60A	1φ 220V 5A	1φ 220V 5A	3φ 220V 10A

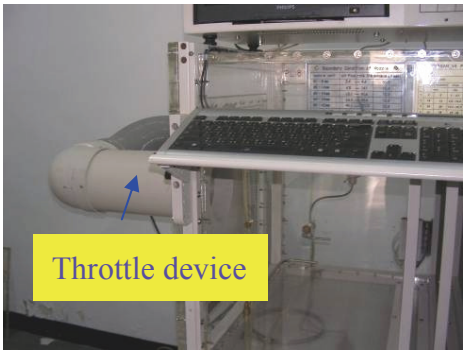
(1). Customized specifications are welcomed, please contact us.

(2). With high static pressure fan test throttle device, testing range of static pressure can reach 150 mmAq.

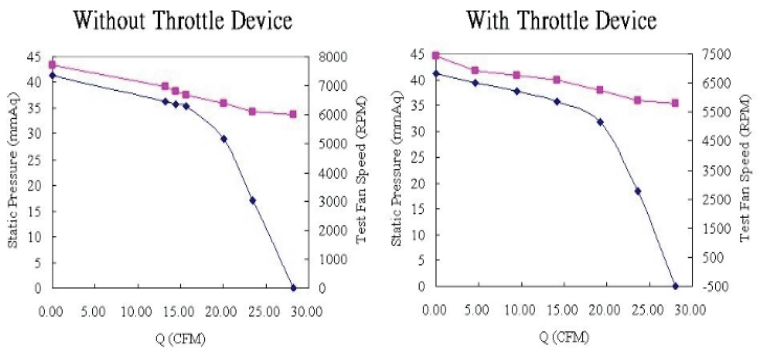
Optional devices

High Static Pressure Fan Test Throttle Device

When a testing point is on the high P and low Q range, it is hard to produce a positive pressure in the downstream chamber of wind tunnel. It causes data overlapping. To solve the problem, the device can adjust P and Q to the proper range. Our high static pressure fan test throttle device can collocate with the self-developed software and control the throttle automatically. Besides, it is suitable for testing both high-static or normal fans.



- PC-controlled throttle device, area resolution is 1/5000.
- Suitable for testing both high-static or normal fans. No influence on wind tunnel accuracy.
- Both manual or automatic control are acceptable. Easy to learn and operate.

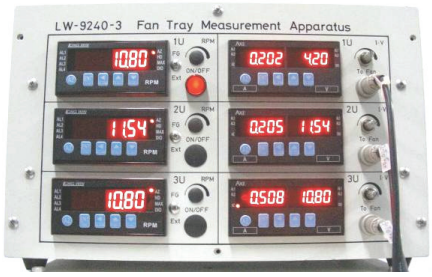


Without a throttle device With a throttle device

Optional devices

Multi-Fan Electric Character and Performance Test Device

It is important to know how single fan performs in a multi-fan system. Thus, it is needed to record voltage, amp, and RPM of each fan. As long as developers get complete data, they can design with optimum. For QC department, it can be used for monitoring working condition of each fan to ensure the quality of products.



- Each cabin with 3 units tests individual DC fan voltage, current & RPM with computerized data acquisition.
- RS-232/485 communication interface for each meter.
- RPM measurement: FG signal. Extra optical sensor can be optionally purchased.
- Power source for fans: through external power supply (DC 0~30V & 0~3A).

P_{STP}	Q_{STP}	Fan-Speed	Fan-Volt	Fan-Amp	Volt2	AMP2	RPM2
mmAq	CFM	RPM	Volt	Amp			
40.11	0.00	31867	11.99	0.671	12.06	0.44	29891
37.28	2.20	32576	12.00	0.639	12.06	0.43	29921
35.92	4.73	31325	12.00	0.615	12.06	0.45	28784
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23.42	19.90	30501	11.99	0.690	12.02	0.53	23897
13.96	22.60	30566	11.99	0.689	12.02	0.54	23531
6.54	24.66	30288	11.99	0.691	12.02	0.55	23348
0.04	26.93	30825	11.99	0.692	12.02	0.55	23178

3122 Thermal Testing Vehicle (TTV)

It is a platform that can adjust testing component setting and supporting structure to know the performance of cooler modules under different condition. It can be combined with 200T thermal wind tunnel for temperature control apparatus. With AMCA wind tunnel, it can analyze the PQ and RQ performance of heat sink. If it is linked with CPU die contact pressure measurement apparatus and Simulation heater unit, the performance of cooler module on CPU can be stimulated.

Specifications

Testing channel dimension:
Maximum: 200 (H) × 200 (W) × 800 (L) mm
Minimum: 25 (H) × 50 (W) × 800 (L) mm
Height dimension can be customized.
The height can be adjusted as 1U to 4U. Below the testing channel, there is a supporting platform.

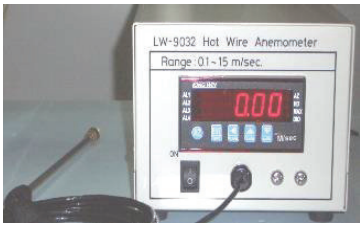
Collocation devices

- AMCA wind tunnel: generates standard air flow rate. During testing, the user set up the flow rate, heating power only. PC will control the other procedures. Results are output as Excel standard report files and plotted automatically to save data processing time and much manpower.

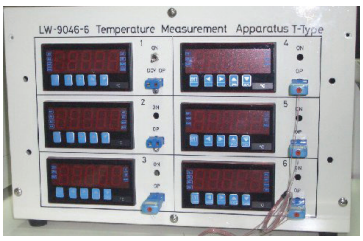
- 200T front temperature controlling apparatus
  - With a flange for LW-3122-TTV connection.
  - Temperature: 25-60℃. PID temperature control.
  - In order to transfer heat to test section, the minimum flow rate is 60 CFM as the working temperature is 70℃
  - Power source: AC220V, 3 phase, 30Amp, 11 kw.

- LW-9000P differential pressure measurement and data acquisition unit
  - Range: 0 ~ 25.4 mmAq
  - Accuracy: ±0.25%, with digit display
  - Communication interface: RS-485

- LW-9032 anemometer and data acquisition device
  - Wind speed range: 0.1～10 m/sec.
  - Hot wire structure, made by TSI, USA.
  - Accuracy: ±2%
  - Micro-process digital display with RS-485 interface

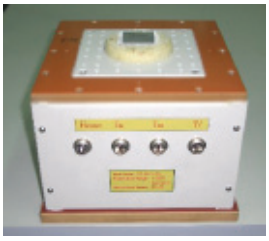


- LW-9046-6 temperature measurement and data acquisition module
  - 6 sets of T-type meters
  - Micro-process digital display with RS-485 interface

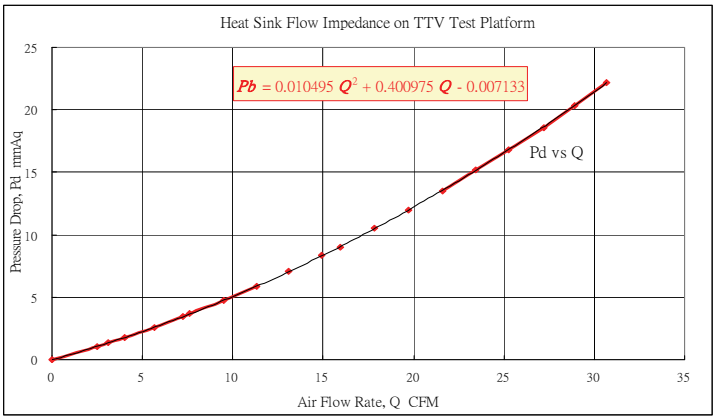


- LW-9052 Heat sink v.s. CPU die press load measurement and data acquisition apparatus
  - Press load range: 0 ~ 100 Kgf
  - Press load accuracy: ±0.1 %
  - Communication interface: RS-485
  - Max. loading displacement: 20 mm
  - Max. unloading displacement: 150 mm

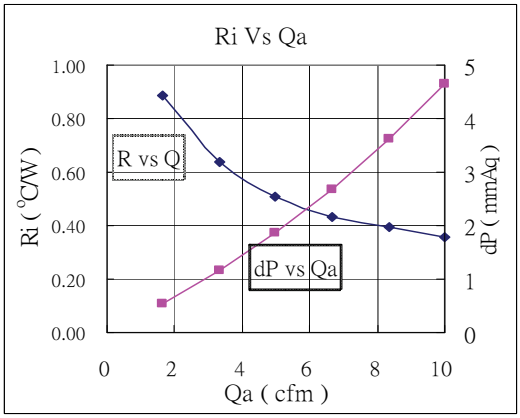
- LW-9053 Dummy heater model, including:
  - A set of 31 × 31 mm (or any customized size) power meter
  - 60V, 3A power supply with PC command
  - Temperature measurement: 3 sets of PT-100 sensor and 3 sets of T-Type sensor



Applications



The system impedance of a cooler module that is measured by 3122 TTV and LW-9015 wind tunnel combination



PQ and RQ curve of a cooler module

9021D Thermal Conductivity Testing Apparatus

The apparatus is based on ASTM-5470-95 Standard "Test Methods for Thermal Transmission Properties of Thin Thermally Conductive Solid Electrical Materials", and measure thermal conductivity K and thermal resistance R of materials.

Operation modes

- **Temperature T2＋T3 and press load are constant.**
- **Constant press load and variable heating power**: Thermal Pads are tested under different working temperature.
- **Constant heating power and variable press load:** Thermal Pads are tested under different press load.
- **Both press load and heating power are variable**.

Principles

- Based on ASTM-5470-95 Standard to design, manufacture, and calculate.
- Thermal Impedance θ:
  $\theta = (T_A - T_D) \cdot A / Q \quad (K \cdot m^2/w)$
- Specimen thickness range: 0.05 ~ 5 mm
- Testing press load range: 30 ~ 250 kgf
  ASTM D 5470 stands for press load: 30 bar.
- Average temperature of $T_2 + T_3$: 50℃
- Average time for a steady state：40 mins.

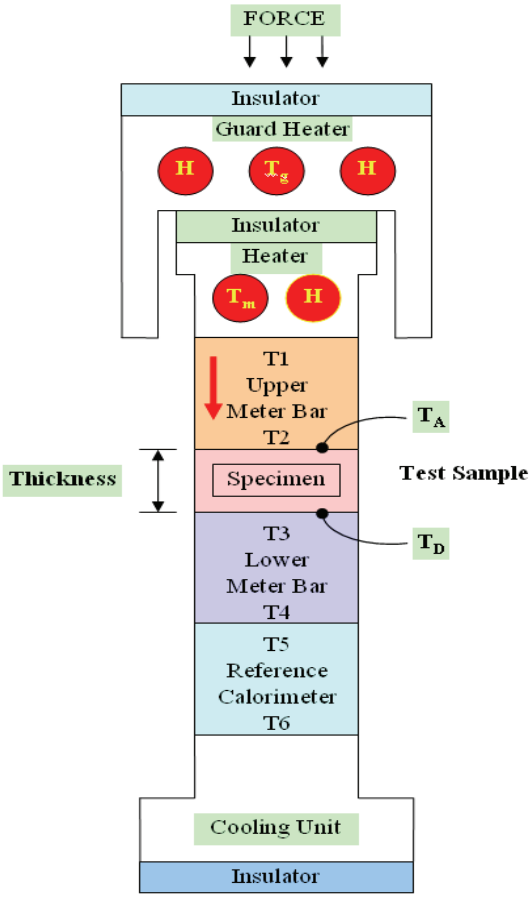
$$T_A = T_2 - \frac{(T_1 - T_2)}{X_1}$$

$$T_D = T_3 + \frac{(T_3 - T_4)}{X_2}$$

$$Q = K_5 A \cdot \frac{T_5 - T_6}{X_3}$$

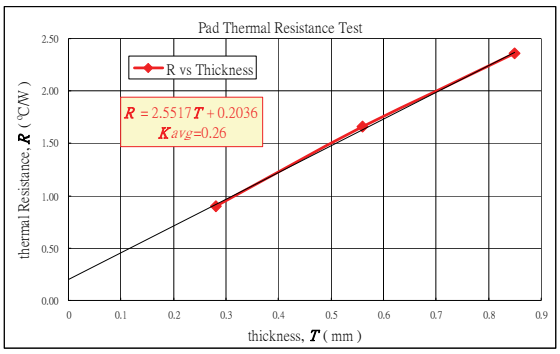
$$R = \frac{T_A - T_D}{Q}$$

$$K = \frac{R}{T_h}$$



Applications

NO	T1	T2	Ta	Td	T3	T4	T5	T6	Q	Press		Thick-	R	K
	℃	℃	℃	℃	℃	℃	℃	℃	Watt	kgf	kgf/cm2	mm	℃/W	w/m.℃
0	27.00	26.99			27.00	26.99	26.99	26.99		37.8	3.0			
1	55.68	53.12	52.98	46.89	46.75	44.31	43.18	29.34	6.75	43.4	3.5	0.28	0.90	3.2
2	56.98	55.04	54.93	44.96	44.84	42.66	41.67	29.37	6.00	39.3	3.1	0.56	1.66	3.0
3	57.38	55.49	55.39	44.05	43.94	41.89	40.96	29.3	5.69	40.5	3.2	0.85	2.36	2.8
4	57.34	55.19	55.07	44.85	44.73	42.52	41.37	28.78	6.14	90.1	7.2	0.83	2.59	3.1
5	56.39	54.31	54.19	45.36	45.23	42.97	41.87	28.93	6.31	169.5	13.5	0.82	2.68	3.3



Heat transfer properties test of a thermal pad:

The relationship between thermal resistance R and material thickness T

Specifications

- Thermal conductivity K range: ＜10 w/m℃
- Upper heating bar maximum temp: 200℃
- Lower meter bar uses ambient temperature water cooling device for cooling cycling.
- Temperature accuracy: ±0.3℃
- Press load range for specimen: comply with the Standard : 30 ~ 35 bars;
  The press load can be adjusted automatically in order to fit for soft thermal pad test.
- Guard & main block temperature measurement meter and auto closed-circuit control
- Upper Meter Bar: efficient diameter ψ36 mm or any customized size ＞ψ20 mm
  2 temperature measurement points, with display and signal output
- Lower Meter Bar: 2 temperature measurement points, with display and signal output
- Reference Calorimeter: 2 temperature measurement points, with display and signal output
- Communication interface: RS-485
- Computerized data acquisition: average temperature measured and calculated
- Specimen dimension: diameter 36 × (0.05 ~ 5)t mm or other assigned sizes.
  The average temperature of two end surfaces is 50℃(condition of Standard), the rest average temperature can be set by oneself within temperature range of upper and lower limit.
- Specimen thickness range: 0.05 ~ 5 mm
  Accuracy: 0.01 mm; resolution: 0.001 mm; Signal input and output are both included.
- Power source: AC220V、5A、single phase
- Overall size: 1200 (W) × 600 (D) × 1900 (H) mm
- Weight: 280 Kgs

9091IR/9241 TIM Thermal Resistance and Conductivity Measurement Apparatus

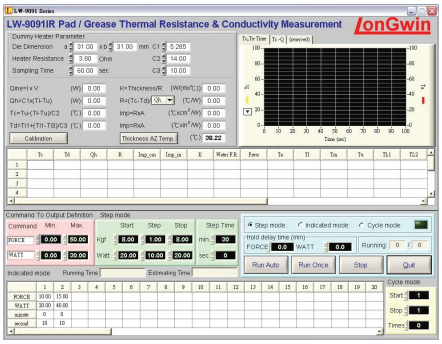
Reducing thermal resistance of TIM is tough for cooling design. In recent years, there is much effort on the development of interface materials, especially grease, thermal gap pads for IT or LED's cooling systems.

To test thermal resistance of interface materials, hot disk, laser flash, and ASTM D 5470 methods are commonly used. Among them, ASTM D 5470 considers contacting thermal interface and emphasizes on thermal resistance on the Z axis, thus it is closest to authentic application environments.

We follow ASTM D 5470 standard to develop the TIM thermal resistance and conductivity measurement apparatus. It has excellent reproducibility, repeatability and automatic measuring software. Furthermore, it is capable of real-time material performance test and life-span examination to check on products' quality.

LW-9091IR

LW-9241



Features

- Follow ASTM D 5470 standard
- Suitable for thermal resistance and equivalent thermal conductivity testing on the Z axis of grease and thermal pad
- Fine mechanic design with excellent reproducibility and repeatability
- LVDT for thickness measuring. Accuracy: 5 μm
- Thermal resistance test under different press load and heating power conditions.
- Temperature of heating and cooling meter bars can be controlled to analyze R in different temperature.
- Capable of life-span examination.
- Automatic software controls designated testing conditions to save operation time and manpower.
- Automatic data acquisition by PC, and results is output and plotted as Excel files.

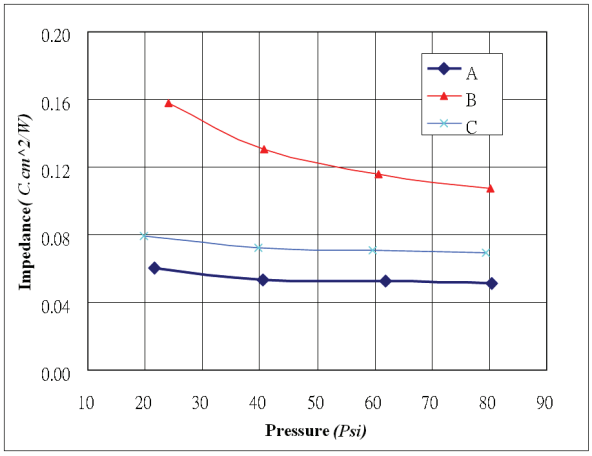
Applications

Equivalent thermal conductivity measurement of interface materials

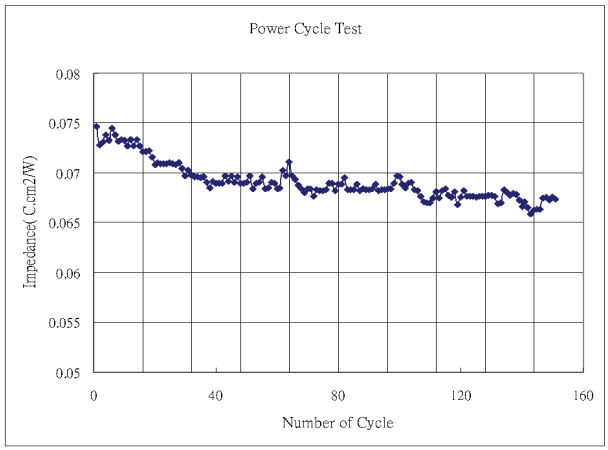
parameter	Th	Tc	P	Q	R	Icm	Iinch	Thickness	K*
unit	℃	℃	Psi	W	℃/W	℃ cm^2/W	℃ $inch^2$/W	mm	W/mK
sample A	80.01	69.64	88.26	62.72	0.165	1.067	0.165	0.096	1.26
	80.00	64.64	88.08	53.78	0.286	1.842	0.286	0.205	
	80.00	60.30	88.08	45.62	0.432	2.786	0.432	0.312	

Th : hot side temperature; Tc : cool side temperature; Pressure : contact pressure; Q : heat flux; R : thermal resistance

Thickness : interface thickness; Icm : thermal impedance (℃.cm2/W); K*: Apparent thermal conductivity (W/m.K)



Thermal resistance test of grease



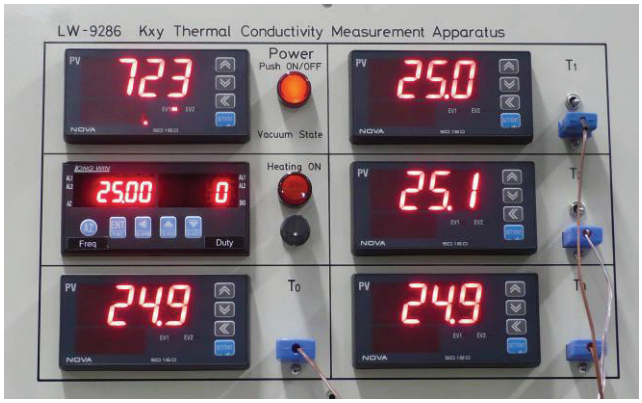
Heat-cycle reliability test of grease

Specifications

Model		LW-9091IR	LW-9241
Principles and standards		Fourier's Law & ASTM D 5470	
Press load range		4-50 kgf, pneumatic control	4-50 kgf, pneumatic control
Thickness measurement		1 set of LVDT	3 sets of LVDT
Thickness range of specimen		0.05~5 mm; Accuracy: 5μm; Reading: 1μm	
Heat flux power	Ta measurement	1 point of T-type	1 point of T-type
	Meter bar temp. measurement	3 points of PT-100	4 points of PT-100
	Max. heating power	180 W	180 W
	Max. temperature	180℃	180℃
	Heat flux die area	25.4×25.4 (mm) or other customized shape or sizes	
Temperature controlling range of water cooling system		Ambient ~60℃, closed-circuit control	
Constant temperature range		Ambient +3℃~50℃	Ambient +3℃~50℃
Insulation design		Meter bars and testing objects are surrounded by insulation material	
Data acquisition		30 channels in RS-485; 2 channels in D/A	
Overall dimensions		1.36(W)×0.84(D)×1.6(H) m	1.4(W)×0.84(D)×1.7(H) m
Power source		AC220V, 10A, single phase	AC220V, 10A, single phase

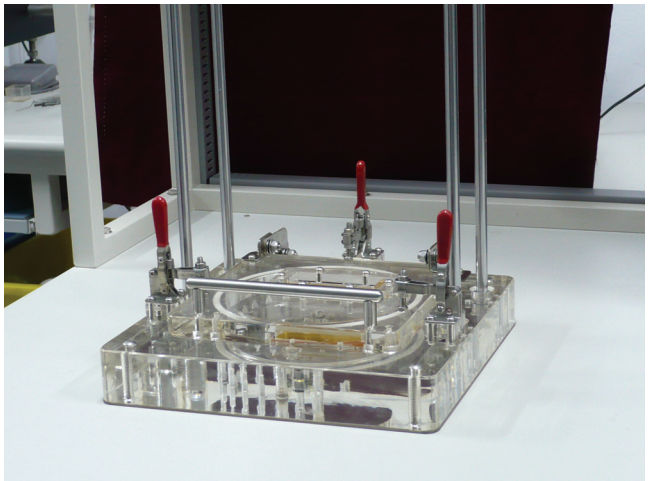
9286 Kxy Material Thermal Resistance Testing Apparatus

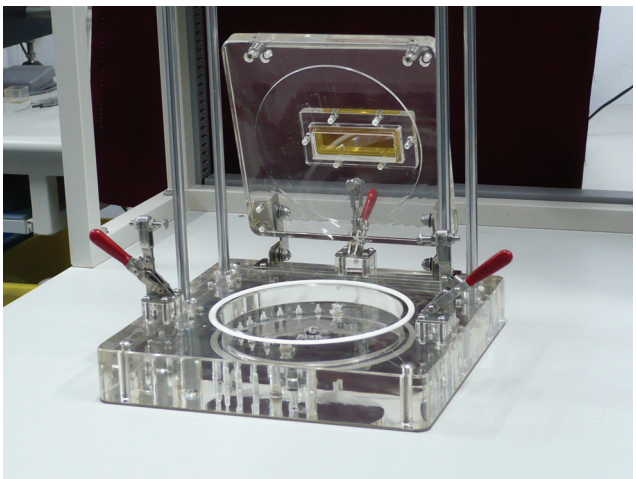
The temperature gradient of a sample is formed by a laser spot heat source. As the heat capacity of spot heat source is constant, IR thermal imaging camera is used for temperature gradient image acquisition. Comparing with the standard sample, it is quick to measure the lateral thermal conductivity Kxy.



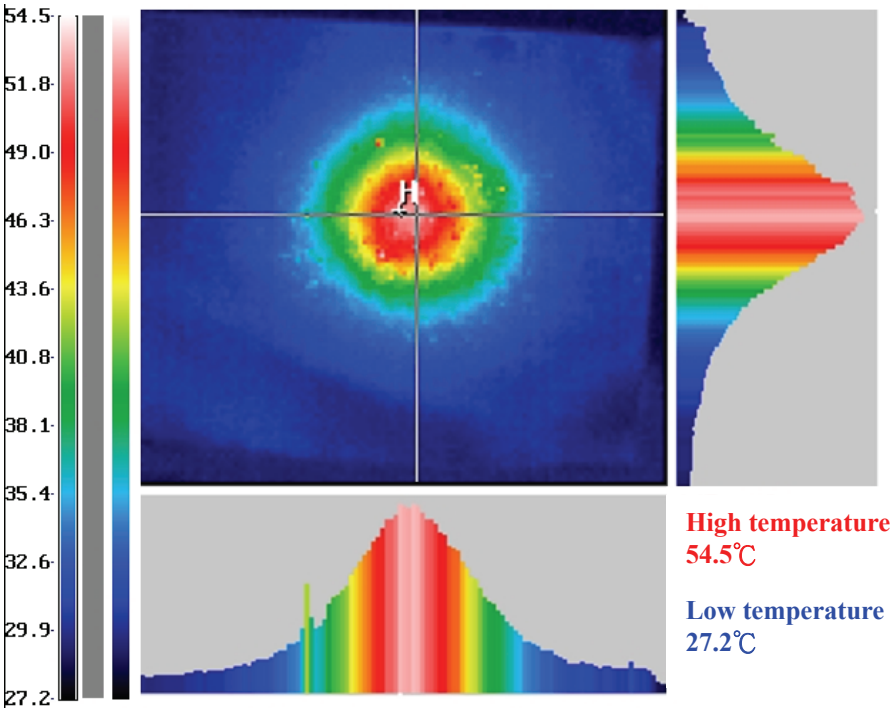
Features

- Vacuum testing chamber to reduce convection interference.
- The area of spot heat source <1 mm^2
- Heat capacity range of spot heat source: 1~5 W
- Spot heat source mode:
  duty 10~100%, PC-based control
- Specimen dimension:
  - Thickness: 0.1~0.5 mm
  - Diameter: <100 mm
- Three standard temperature sensors as the sample stand. Measure real temperature in the meantime and calibrate with IR thermal imaging camera
- Temperature measuring array of IR thermal imaging camera: 47×47 pixels
- As the mass of specimen and the heat capacity of spot heat source is constant, specific heat (Cp) and heat diffusion coefficient (α) can be got.

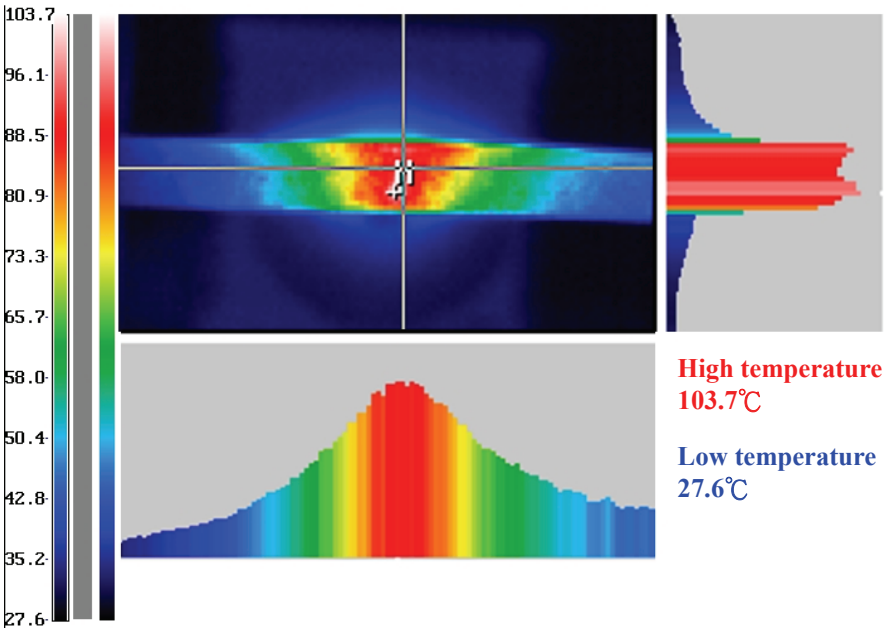




Applications



As the laser was just turned off, the temperature distributions of a stainless steel slice.
Slice dimension: 0.2(T)×46×54 mm

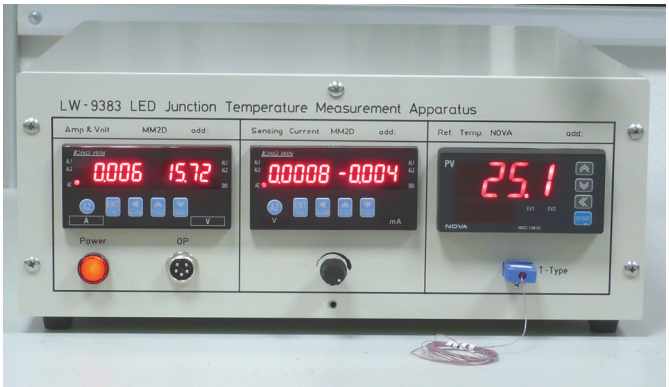


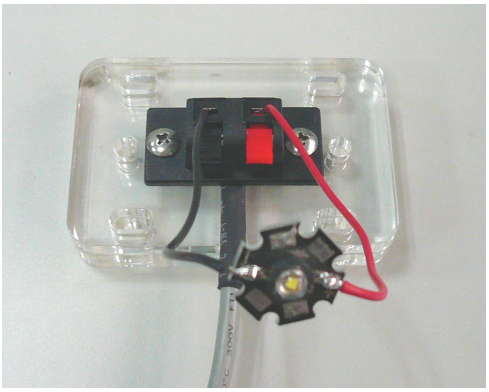
As the laser was still on, the temperature distributions of a narrow copper slice.
Slice dimension: 0.05(T)×7×52 mm

9383 LED Tj Thermal Resistance Measurement Apparatus

Due to the environmental saving resource issue, LED is developed vigorously and applied to illumination considerably. Its working temperature is crucial to products' reliability and life span. As a result, the thermal solution design determines whether it can be mass produced or not.

Since LED development is in an initial stage, there is no standard method for its thermal resistance test. Temperature measurement of diode array is the most common method for real application. For this reason, Long Win has developed a LED Tj measurement apparatus by following the diode array method. It has excellent repeatability and reproducibility. As cooperating with the automatic measurement software, it is useful to know the instantaneous LED performance and long-term life-span experiment.

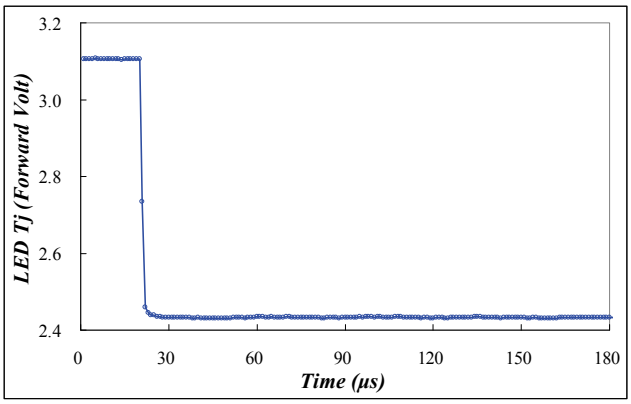




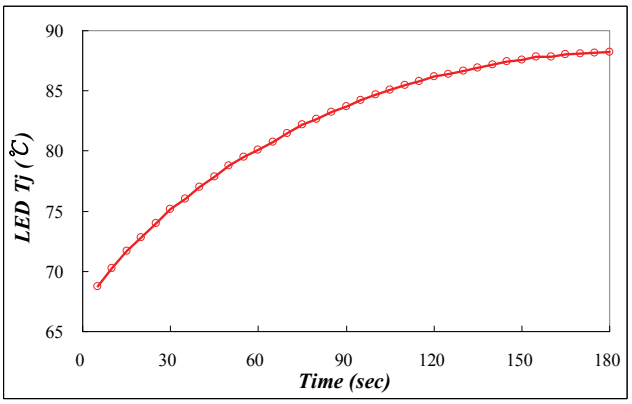
Features

- Available for the measurement of LED Tj and thermal resistance test.
- Modify Tj measurement standard of the diode array to design.
- Delicate structure with excellent repeatability and reproducibility.
- Fast data acquisition to reveal actual LED Tj value.
- LED Tj and thermal resistance test under different working power.
- Available for long-term heating life-span test.
- The automatic measurement software to control test condition to save manual operation time.
- Data acquisition automatically and output as Excel files.

Applications



Instantaneous LED Tj measurement



Long-term LED Tj measurement

Specifications

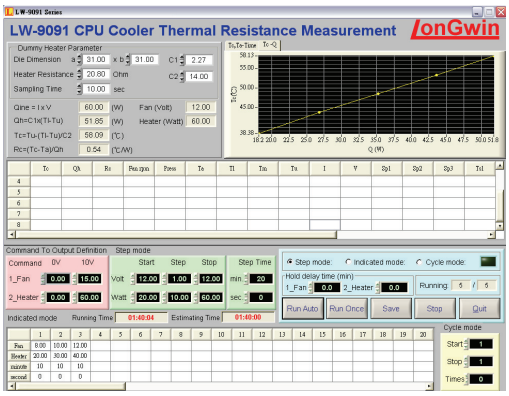
Ta measurement	1 point of T-type sensor
Sensing Current	0～1.999 mA
Heating power	30V / 3A
Operating temp. range	~25℃
Data acquisition	DAQ 200KHz
Data output	Excel files
Dimension	36(W)×40(D)×16(H) cm
Power source	AC110~220V, 5A, single phase

9091 CPU Cooler Thermal Resistance Measurement Apparatus

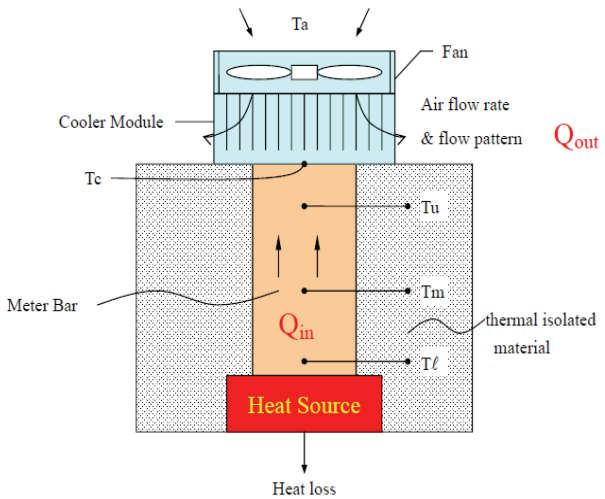
Thermal resistance of cooler modules is crucial for IT thermal solution. It means that cooling efficiency is a key factor for products' working ability. Among all testing methods for thermal resistance of materials, ASTM D 5470 considers contacting thermal interface and emphasizes on thermal resistance on the Z axis, thus it is closest to authentic application environments. So we modify ASTM D 5470 standards, control environmental parameters precisely, simulate the working condition of cooler modules, and develop an apparatus for measuring thermal resistance of CPU cooling modules. It has excellent repeatability and reproducibility, real-time material performance test and life-span examination to check on quality.

Features

- Modify ASTM D 5470 standard
- Fine mechanic design with excellent reproducibility and repeatability
- Thermal resistance under different loading and temp.
- Measuring heating power Qh and Tc temperature
- Automatic software controls designated testing conditions to save operation time and manpower.
- Automatic data acquisition by PC, and results is output and plotted as Excel files.



Principles



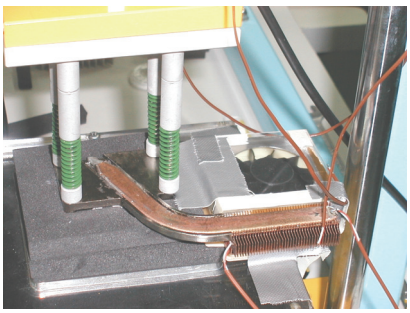
$$Q_{out} = K_m A \cdot \frac{T\ell - Tu}{\Delta X} \quad , \quad \Delta X = T\ell - Tu$$

$$\frac{\Delta X}{2} = \overline{T\ell\ Tm} \ , \ \overline{Tu\ Tm}$$

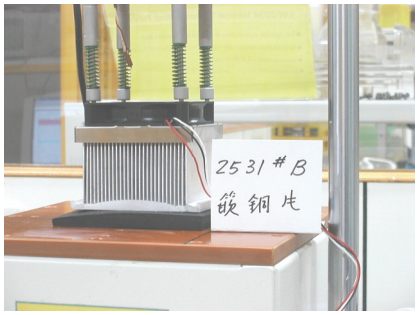
$$T_c = T_u - \frac{\Delta X_1}{\Delta X}(T\ell - Tu) \quad , \quad \Delta X_1 = \overline{TcTu}$$

$$R = \frac{T_c - Ta}{Q_{out}}$$

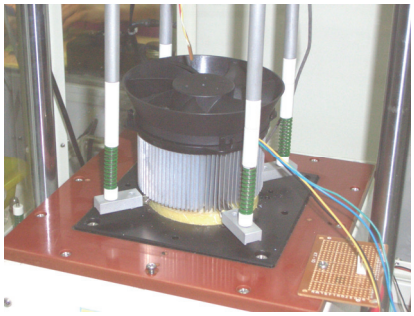
Applications



NB cooler module test



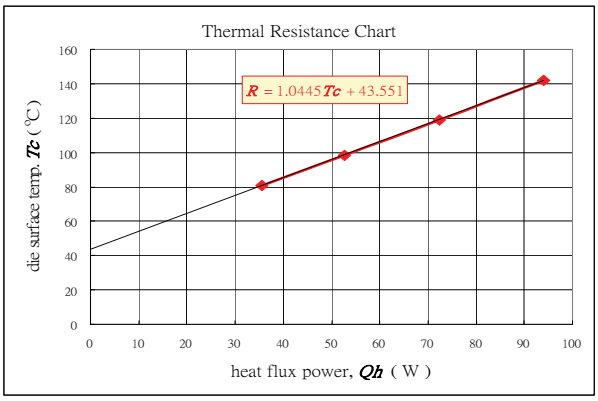
DT cooler module test



DT cooler module test

LW-9091 Cooler Thermal Resistance Test

press	Ta	Tl	Tu	Tc	Qh	R
kgf	℃	℃	℃	℃	W	℃/W
10.4	35.5	34.42	36.98	34.31	--	--
10.6	39.0	77.12	60.42	80.93	35.57	1.18
10.8	39.7	92.97	68.28	98.30	52.59	1.11
11.0	39.8	111.62	77.68	118.80	72.29	1.09
11.2	40.0	132.70	88.56	141.97	94.02	1.08



Specifications

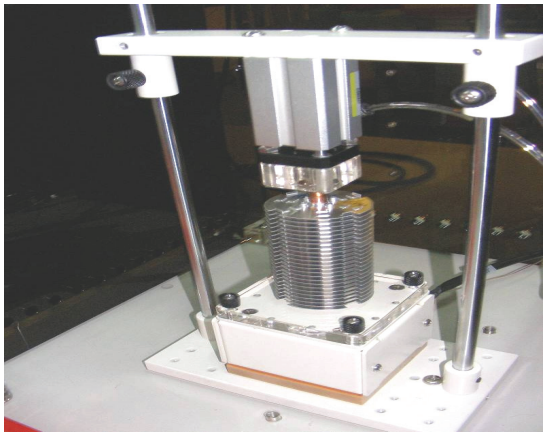
Functions		Specifications
Press Load	Range	0~100 kgf, including amplifier, display and RS-485 output
	Setting method	Manual
Temperature	Ta	1 point of T-type with RS-485 communication interface
	Meter bar	3 points of PT-100 with RS-485 communication interface
	Tl & Tc	Tl＜180℃ Tc temperature is related to heat sink
Power supply	Heating	1 set with DC, 180W
	Controlling fan	1 set with 90W; FG signal for RPM measuring
Heat Flux Power		1 set with die 25.4 × 25.4 mm, or other customized sizes
Data acquisition	Link component	A 9 Pin / 2m wire with switch, RS-485 interface
	Channels	30 channels in RS-485; 2 channels in D/A
Chamber	Temp. range	Ambient +3℃~50℃
	Internal size	520 (W) × 430 (D) × 790 (H) mm
Overall dimension		1.36 (W) × 0.84 (D) × 1.6 (H) M
Power source		AC220V, 5Amp, single phase

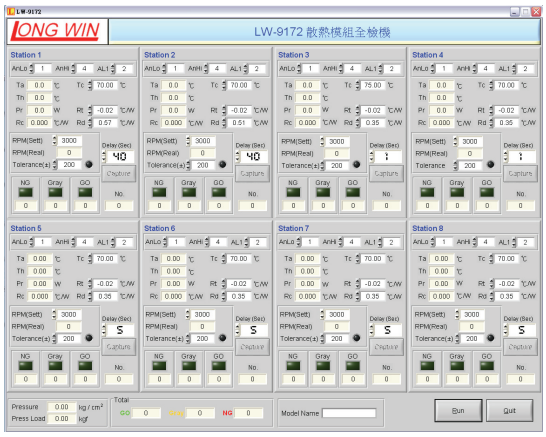
9172 Cooler Module Thermal Resistance Transient Inspection Apparatus

Cooler modules play an important role on IT industry, thus there is serious request on their cooling quality. For manufacturers, having a good QC inspection is crucial. In addition to fast inspection, good identification and reproducibility are also important. Long Win has developed whole new generation for cooler module inspection, and helps you to check on your products with excellent repeatability and reproducibility.

Features

- Fast inspection 40sec/per channel for each 400 g cooler module
- Thermal resistance test deviation average＜0.02; repeatability error less than 0.03
- Besides feeding all operate automatically to avoid manual mistakes.
- Auto steady state calibration, transient test & data acquisition
- Precise thermometer for temperature calibration
- User-friendly software operation, judge GO/NG automatically. Results are output as Excel files that can be analyzed easily.
- It can focus on natural convection cooling module inspection, and each testing unit cooperates an independent chamber.





Applications

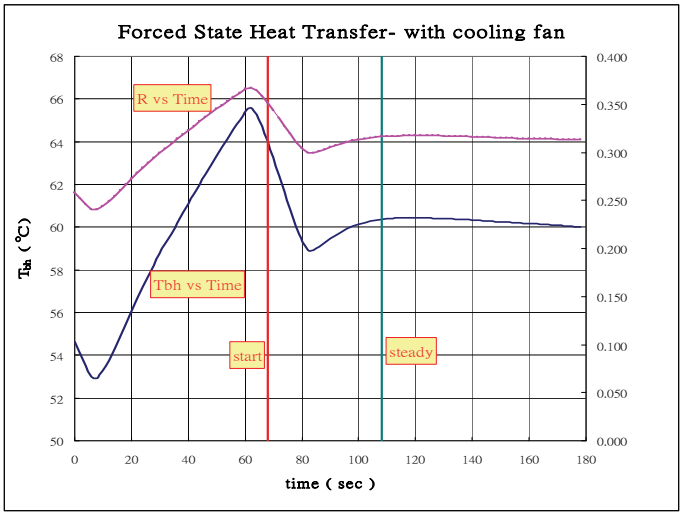


Figure. A steady-state test

Specifications

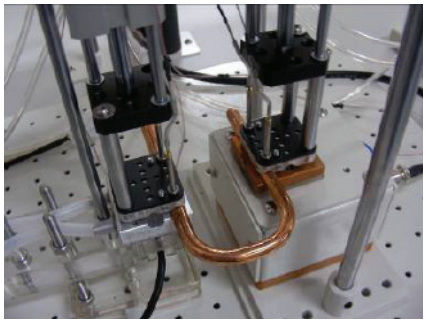
Main body	Individual testing module	4 units set on an alignment
	Paprameters	Heating power, Ta, Tbh(block), press load To calculate thermal resistance accordingly
	Average transient testing period	3mins/set for each 400 g cooler module
	Temp. calibration	30~90℃, including heating control and 2 precise mercurial thermometers
Testing module	Max. heating power	Power supply with DC, 180W; Stability: 0.5%
	Simulated die size	31×31 mm or other customized sizes
	Temp. range	0~190℃, computerized acquisition
	Wrapping aroung	Insulation materials
	R calculation	Take input electrical power as equivalent to heating power.
Cooling system	Sizes	Customized by the heating source
	Cooling fan	4 sets of individual powered fans, max. power: 15V, 0.5A
	monitoring	RPM display, PC communication
Ta	Acquisition and display	Independent modules, numerous display, and PC command
Press load	Offered by	Pneumatic control
	Valve and display	PC communication
Power supply	Independent units; Electrical power and Tbh display through PC.	
Module location	Threads on the heating plate modules. Suitable for different models and sizes.	
Steady state test	Software included. See trends of module characteristic and resonable tolerance.	
Overall dimension	2(L)×0.8(W)×1.8(H) m	
Power source	AC220V, 10A, single phase	

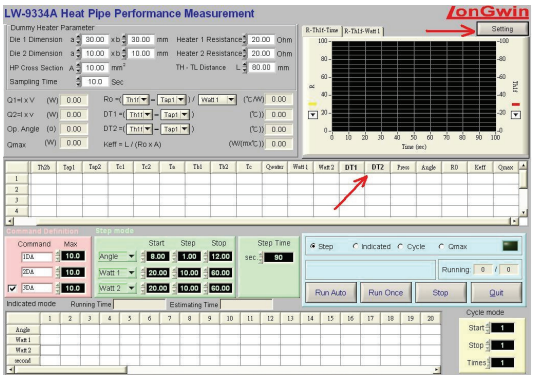
9334 Heat Pipe Thermal Resistance and Qmax Measurement Apparatus

Heat pipes are generally applied in industries, especially in electronics cooling field. The performance of heat pipes determines the cooling capability. Thus, it is important to test for the heat pipe, cooler module, and system suppliers. Long Win has developed a latest generation of computerized heat pipe tester to assist designers understanding factors such as heating power, tilt angle, temperature and evaluate its performance. PC-based control system promotes your research effect.

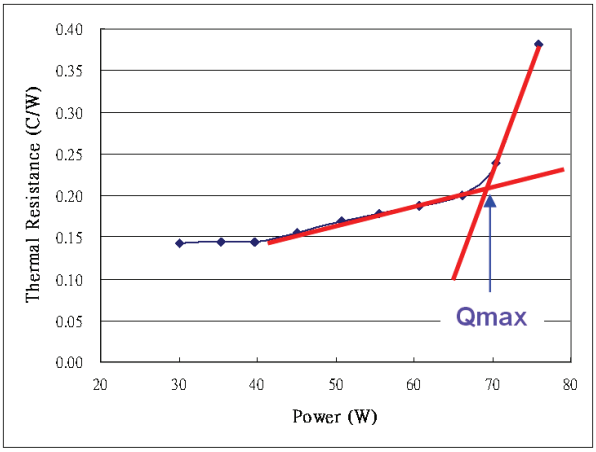
Features

- A computerized system that controls water cooling, heating, attitude adjustment, data acquisition and analysis.
- Test thermal resistance and Qmax automatically.
- Attitude (tilt angle) can be adjusted automatically.
- Temperature of chamber (environment) can be modified automatically.
- Water cooling temperature: Ambient +5~50℃; closed-loop control; using numeric flow meter to estimate the flow rate.
- Customized heating and water-cooling modules for variant shapes of heat pipes.
- Pre-loading temperature sensor and pneumatic press mechanism are designed together to increase the reliability and efficiency in measuring temperature.
- Attached with DC power supply, PC-based control for heating power.
- Testing modules are connected with PC to record heating power, average temp. on the cooling side, Tbh, press load value, ΔT, calculated R value.
- Output as Excel files, easy to analyze and do statistics.

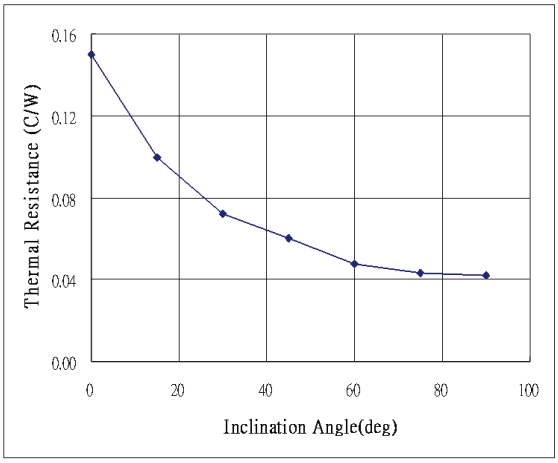




Applications



Qmax test for heat pipes



Thermal resistance test of heat pipes at different inclination angles.

Specifications

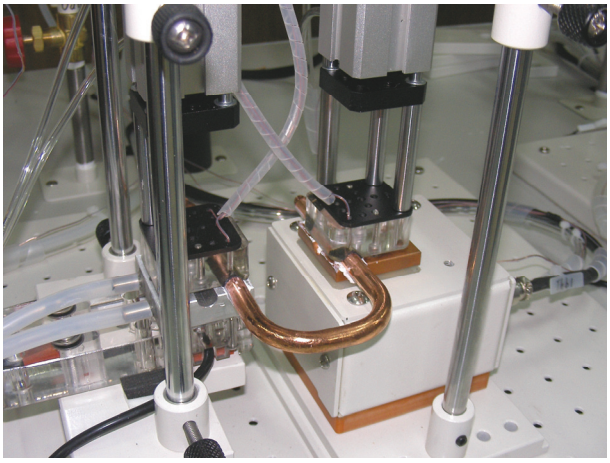
Operation conditions		Max. test power	360W
		Tilt angle	±90°
		Temp. of local environment	Ambient +3℃~40℃
		Press load range	1~20 kgf
Measuring parameters	Temperature	0℃~190℃; Accuracy ±1.0℃, Reading 0.1℃ 8 sets of T-type thermocouple sensor	With display and RS-485 interface
	Press load	0~20 kgf; Transducer accuracy ±2.0%，	
	Cooling water flow	200-10000 ml/min; Accuracy ±3%	
	Voltage	0~100 V; Accuracy ±0.5%	
	Current	0~10 A; Accuracy ±0.5%	
Testing devices	Heating module	2 sets, the contact area can be customized	
	Power supply	DC 0~60V，6A，360W	
	Pneumatic	2 sets with 50 mm displacement; Press load range 1 ~ 20 kgf	
	Press down fixture	4 pcs in 1 set, with springs to adjust pivots	
	Cooling module	1 set, independent temp. and flow rate control; Air cooling can be chosen optionally	
	Attitude adjustment	Angle ±90°; PC controlled; Numeric display	
	Fixed thermocouple	2 sets; Springs force on the measuring T.C. points .	
Hardware / Interface		PC base / RS232/RS485 communication interface	
Software interface		Lab window / Output as Excel files	
Dimension / Weight		0.8 (W) × 1.8 (L) × 1.6 (H) M; 500 kg	
Power source		AC220V, 10A, single phase	

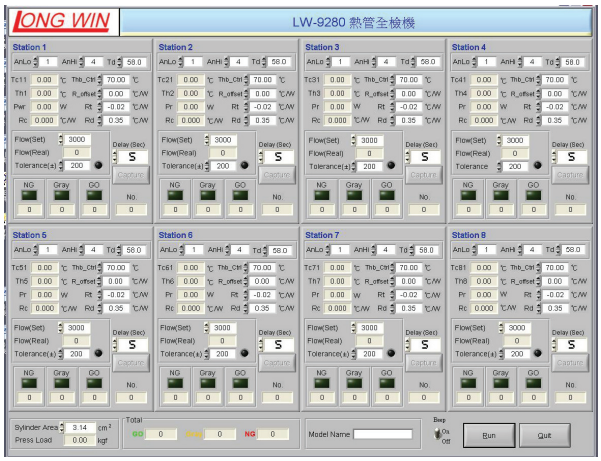
9280 Heat Pipe Thermal Resistance and Qmax On-line Inspector

Heat pipes are generally applied in industries, especially in electronics cooling field. The performance of heat pipes determines the cooling capability. Thus, it is important to test for the heat pipe, cooler module, and system suppliers. Long Win has developed a latest generation of computerized heat pipe inspector with excellent repeatability and reproducibility to evaluate its performance.

Features

- 4 test units: heat pipe thermal resistance inspected in a short time; ΔT measurement; ±0.01℃/W of thermal resistance distinguishability; Spontaneous Qmax test
- 4 sets of independent water cooling modules. Temperature: Ambient +5~50℃; closed-loop control; using numeric flow meter to control and measure each unit of water flow rate.
- Customized heating and water-cooling modules for variant shapes of heat pipes.
- Pre-loading temperature sensor and pneumatic press mechanism are designed together to increase the reliability and efficiency in measuring temperature.
- Attached with 4 sets of DC power supplies, PC-based control for heating power.
- Testing modules are connected with PC to record heating power, average temp. on the cooling side, Tbh(heating block), press load value, ΔT, and calculated R value.
- Computerized multi-heating power control for average transient state test to regress Qmax automatically
- User-friendly software operation, judge GO/NG automatically. Results are output as Excel files that can be analyzed easily.





Applications

Thermal resistance results for 20 heat pipes

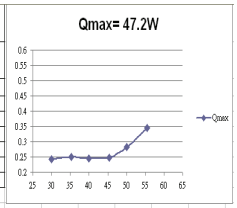
Cooler Module: #1 Station Test Data Record (07-07-2008)

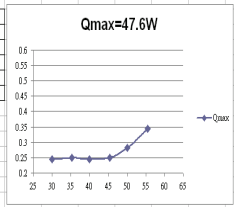
NO.	Press load	Water Flow	Power	Tc	Th	Test Time	Rd	Rt	Rc	error	Result	finish time	Deviation
	Kgf	CC	W	℃	℃	sec	℃/W	℃/W	℃/W			Hr:min:sec	R_dev
1	5.81	305	23.364	49.7	58.7	10	0.35	-0.02	0.385	-0.04	OK	10:23:35	0.006
2	5.78	300	23.364	49.6	58.9	10	0.35	-0.02	0.398	-0.05	OK	10:25:59	-0.007
3	5.81	297	23.364	49.6	58.8	10	0.35	-0.02	0.394	-0.04	OK	10:29:01	-0.003
4	5.78	305	23.364	49.4	58.6	10	0.35	-0.02	0.394	-0.04	OK	10:31:46	-0.003
5	5.81	299	23.364	49.4	58.5	10	0.35	-0.02	0.389	-0.04	OK	10:34:47	0.002
6	5.78	301	23.364	49.4	58.4	10	0.35	-0.02	0.385	-0.04	OK	10:37:50	0.006
7	5.81	303	23.364	49.4	58.6	10	0.35	-0.02	0.394	-0.04	OK	10:40:58	-0.003
8	5.78	306	23.364	49.5	58.6	10	0.35	-0.02	0.391	-0.04	OK	10:43:52	0.000
9	5.81	308	23.364	49.5	58.6	10	0.35	-0.02	0.389	-0.04	OK	10:46:17	0.002
10	5.81	301	23.364	49.6	58.4	10	0.35	-0.02	0.377	-0.03	OK	10:49:22	0.015
11	5.81	305	23.364	49.4	58.4	10	0.35	-0.02	0.385	-0.04	OK	10:53:27	0.006
12	5.81	305	23.364	49.3	58.2	10	0.35	-0.02	0.381	-0.03	OK	10:56:27	0.010
13	5.81	296	23.364	49.5	58.8	10	0.35	-0.02	0.398	-0.05	OK	11:31:41	-0.007
14	5.81	304	23.364	49.4	58.8	10	0.35	-0.02	0.402	-0.05	OK	11:34:56	-0.011
15	5.81	303	23.364	49.4	58.6	10	0.35	-0.02	0.394	-0.04	OK	11:37:49	-0.003
16	5.81	306	23.364	49.4	58.6	10	0.35	-0.02	0.394	-0.04	OK	11:40:45	-0.003
17	5.81	300	23.496	49.3	58.4	10	0.35	-0.02	0.387	-0.04	OK	11:43:37	0.004
18	5.81	302	23.496	49.4	58.7	10	0.35	-0.02	0.396	-0.05	OK	11:56:23	-0.005
19	5.81	304	23.364	49.3	58.6	10	0.35	-0.02	0.398	-0.05	OK	11:59:16	-0.007
20	5.81	306	23.364	49.5	58.8	10	0.35	-0.02	0.398	-0.05	OK	11:59:49	-0.007
21	5.81	301	23.364	49.3	58.3	10	0.35	-0.02	0.385	-0.04	OK	12:02:33	0.006

Qmax results of heat pipes

Cooler Module:Qmax #1 Station Test Data Record (07-03-2008)

NO.	Press load	Power	Thb	Th	Tc	Tcb	dT	R	Rbc	Qwater	finish time
	Kgf/cm²	W	℃	℃	℃	℃	℃	℃/W	℃/W	CC	Hr:min:sec
1	1.80	29.9	51.9	46.1	38.8	30.6	7.3	0.244	0.437	322	11:56:54
2	1.80	35.2	57.2	50.3	41.5	30.7	8.8	0.250	0.446	323	12:01:53
3	1.80	40.0	61.2	53.2	43.4	30.8	9.8	0.245	0.445	322	12:06:54
4	1.80	45.4	65.4	56.8	45.5	30.9	11.3	0.249	0.438	326	12:11:54
5	1.80	50.1	71.4	61	46.9	30.9	14.1	0.282	0.489	323	12:16:53
6	1.80	55.5	80.2	67.3	48.2	31	19.1	0.344	0.577	325	12:21:53
Qmax =	47.2	Watts	; Running Time =		1801	Sec.					
7	1.80	29.9	51.9	46.1	38.8	30.6	7.3	0.244	0.437	322	11:56:54
8	1.80	35.2	57.2	50.3	41.5	30.7	8.8	0.250	0.446	323	12:01:53
9	1.80	40.0	61.2	53.2	43.4	30.8	9.8	0.245	0.445	322	12:06:54
10	1.80	45.4	65.4	56.8	45.5	30.9	11.3	0.249	0.438	326	12:11:54
11	1.80	50.1	71.4	61	46.9	30.9	14.1	0.282	0.489	323	12:16:53
12	1.80	55.5	80.2	67.3	48.2	31	19.1	0.344	0.577	325	12:21:53
Qmax =	47.6	Watts	; Running Time =		1802	Sec.					





Specifications

Test units	4 sets
Measuring parameters	Thermal resistance(R)；ΔT；Max. heat transfer(Qmax)
thermal resistance distinguishability	± 0.01 (℃/W)
Heating source	DC power (90W, 180W, or 300W)
Heating power meter	1set/each unit (controlled by PC command)
Heating bar thermometer	T-type thermocouple 1 set / each unit
Heating side thermometer	T-type thermocouple 2 sets / each unit; average temperature
Cooling side type	Controllable water cooling (ambient~50℃)
Water cooling bar thermometer	RTD type (PT-100) 1set / unit
Cooling side thermometer	T-type thermocouple 2 sets / unit; average temperature
Contact type	Adjustable pneumatic press load type
Cooling water flow meter	1 set / each unit
Movable distance for heating/ cooling bar	On the plane direction: 0~300mm (or customized specifications)
Hardware and interface	PC base / RS232/RS485 communication
Software	Lab window / Output as Excel files
Overall dimension	2.0(L)x 0.8(W)x 1.8(H) m
Power source	220 V, 15A, Single phase

9022 series – Natural Convection Constant Temperature and Humidity Chamber

Thermal test is one of the most important reliability tests. Strict and authentic testing environemnts can discover any flaws from products in advance and improve them. Normal constant T chamber is under forced convection condition, and it usually over-estimate the cooling performance. As a result, the thermal problems still happen after entering the market. To solve the issue, we develop a chamber with natural convection. It is close to the authentic environment to meet the quality testing needs.

LW-9022

LW-9022M/L

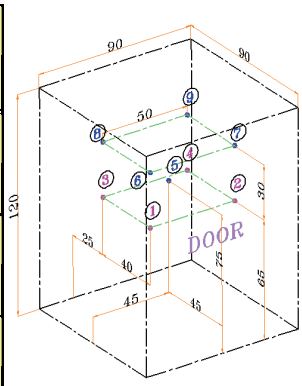
Features

- Temperature uniformity inside the chamber: ± 2℃
- PID temperature control. Accuracy: ± 0.5℃
- Temperature range: Ambient＋Δ45℃, max.＜70℃.
- Emphasize on the design of natural convection ventilation.
- A platform to adjust the height of testing object.
- Infrared heating
- Wheels installed. The chamber can be moved easily.
- Made by clear acrylic. It is easy to monitor the experiment and flow visualization can be carried out.
- Reference T points can be adjusted in the chamber.
- A temperature controller with programmable touch screen can be set optionally.

Applications

9-point temperature measurement inside the chamber

Point	Measured T									Avg.	STD.	Relative non-uniformity
Setting T	1	2	3	4	5	6	7	8	9			
40℃	40.1	40.2	39.8	40.0	40.2	40.1	40.3	39.9	40.0	40.07	0.16	0.39%
Deviation	0.0	0.1	-0.3	-0.1	0.1	0.0	0.2	-0.2	-0.1			
50℃	50.8	50.6	50.1	50.5	50.4	50.8	50.3	49.9	50.1	50.39	0.32	0.63%
Deviation	0.4	0.2	-0.3	0.1	0.0	0.4	-0.1	-0.5	-0.3			
60℃	60.1	60.4	59.8	60.3	60.1	60.3	60.2	59.8	60.6	60.18	0.26	0.44%
Deviation	-0.1	0.2	-0.4	0.1	-0.1	0.1	0.0	-0.4	0.4			
70℃	70.7	71.0	70.2	70.8	70.1	71.2	70.7	69.3	69.8	70.42	0.62	0.87%
Deviation	0.3	0.6	-0.2	0.4	-0.3	0.8	0.3	-1.1	-0.6			



Locations of 9 points

Specifications

Model	LW-9022	LW-9022M	LW-9022L
External dimension (W×D×H) cm	100 × 120 ×160	120 × 150 × 200	240 × 120 × 205
Internal dimension (W×D×H) cm	86 × 86 × 116	116 × 146 × 176	200 × 110 × 180
Temperature range	Ambient +3℃~75℃	Ambient +3℃~75℃	Ambient +3℃~75℃
Accuracy	±0.5℃	±0.5℃	±0.5℃
Uniformity	±2℃	±2℃	±2℃
Far-infrared heater	4sets	8 sets	12 sets
Heating power	2.6 KW	5.2 KW	8.0 KW
Temperature controller	1 set of PID	4 sets of PID	4 sets of PID
Main material of the case	Clear acrylic 20 mm(t)		
Height-adjust platform	30×35 cm (manual)	50×100 cm (motor-driven)	50×100 cm (motor-driven)
Power socket	AC110V 6-hole and AC220 6-hole, 1 set each		
Power source	220V, 15A, 1-phase	220V, 15A, 3-phase	220V, 30A, 3-phase

1. Dimension of whole apparatus, chamber, and doors are customizable.
2. A temperature controller with programmable touch screen can be set optionally.

9134 Flow Visualization Water Tank

Flow visualization is an important strategy to study fluid science. Although flow visualization can be taken as a qualitative property, it seems more crucial to actually see it.

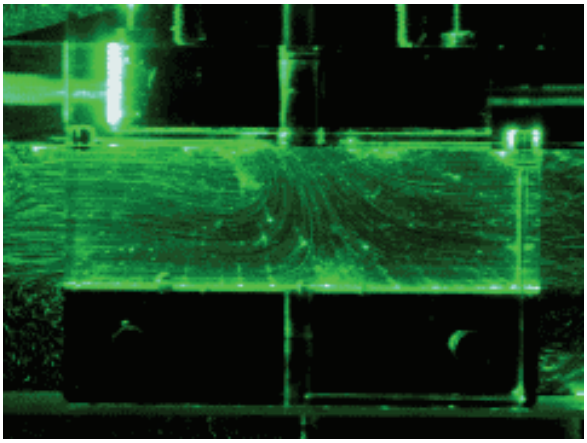
Since air particle is smaller than 0.5 μm in diameter and the flow field is hard to control at low wind speed, the outcome to observe air flow field is not ideal relatively.

Using water to be the working fluid has several advantages. First, when model dimension is identical as in the air, the relative motion speed is 15 times lower. Seond, the average diameter of the visualizing particle is 30 μm, which density is close to 1 g/cm^3, and not soluble in water. As long as the laser sheet is bright enough, a nice flow visualization result can be shown.

Features

- Simulate system or sub-system to observe working flow field of active cooler modules.
- Use filter device to remove dye during experiment.
- A cycling pump and storage tank – to save water resources.
- Laser sheet generator and XY platform are both included.
- With a CCD camera and data acquisition software.

Applications



Model of CPU active cooler module to simulate the flow field between two fins

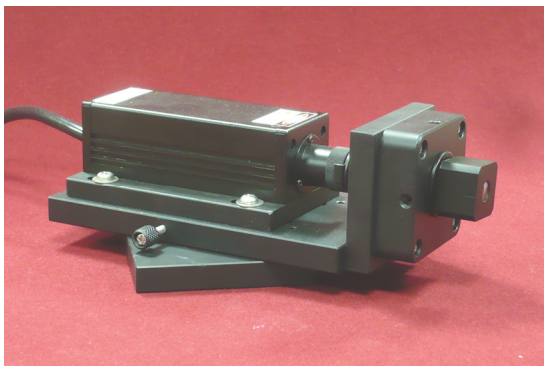
Cooperate with clear desktop chassis model

Specifications

Test tank dimension	0.9(W) x 0.7(D) x 0.9(H) m
Lower tank	Water storage. A cycling pump and filter device included
Water cycling control	Use valves driven by motor or manual for logical controlling.
Observation of fan flow field	Fan driving device, servo motor and device are included A fan (φ50) has 10 ~ 1000 RPM is equal to 150 ~ 15000 RPM in air.
Blow & suction cycling control	The power for flow visualization in chassis Flow rate range: 1 ~ 65 lpm; equal to 0.5 ~ 36 CFM in air Including blow & suction connector. Excluding clear chassis models
Laser sheet	Wavelength: 532 nm; Power: 300 mW at 25℃
Camera	A CCD camera with a zoom lens and movable stand
Image acquisition	The software is included.
Particle for flow visualization	1000 ml/bottle, plastic material, paste-like, diameter 30 μm, round shape
Optional devices	Clear model and diving power for testing
	Clear chassis model and internal structure

9117 Laser Sheet Generating Unit

Carrying a special lens to generate two-dimensional laser sheet. It can collocate with the flow visulization tank or water tunnel to observe flow field in water. On the other hand, it also can collocate with smoke generator to observe flow field in the natural convection chember or wind tunnel. A laser sheet generating unit is an essential tool to understand flow field characteristics.



Specifications

Laser beam power	300 mW
Laser beam	diameter 2.5 mm
Wavelength	green 532 nm
Pumping source	LD
Output stability	≦±5%
Cooling	air
Operation mode	cw & TEM
Photo sheet lens	available rotation for 360˚
Light sheet, fan angle	30˚ / 45˚ / 60˚
Input power	AC110 ~ 240V
Vertical lifting platform	□ 100 × 100 mm
Available up and down range	100 mm Load: 1 kg
Standard accessories	Laser module cw & pulse TTL signal output With a power supply
	Light sheet lens
	Plate fixture
	Adjustable jigger lift □100 × 100 × 100 (H) mm
Warranty	1 year

9205C Smoke Chamber and Generator

Use water soluble grease – not sticky, not stinky, not burnable, and non-toxic. Smoke is generated after heating, and emitted by fan drive through a ventilator. It can be the seeding source for air flow visualization and can be cooperate with LW-9117 Laser Sheet Generator.

Specifications

Material of chamber	Clear acrylic on one side. Thickness: 10 mm
Frame	Made of iron, 4 universal wheels with skids The chamber is mounted inside the frame.
Pressure transporter	Upper the chamber, 1 fan (φ90 mm) and regulating aperture
Smoke output	Max. 100 × 200 mm, with a removable lid Globe valves and output opening: 10 sets or more.
Water condensation device	Included
Smoke generator	In the chamber; Operated Manually
Smoke output mode	Both manual pulse and continuous can be selected.
Grease	500 ml/bottle not sticky, not stinky, not burnable, and non-toxic
Overall dimension	50 (W) × 45 (D) × 91 (H) cm
Significant chamber dimension	50 (W) × 45 (D) × 45 (H) cm
Weight	Net 80 kg
Power source	AC220V, 5A, single phase

Design & Manufacture	Agent
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