

규 격 서

Commodity Description

ITEM NO. (품목번호)	DESCRIPTION (품목 및 규격서)	Q'TY (수량)	UNIT (단위)
2	LED엔진 열적 인터페이스 균일도 및 열저항 측정 시스템 (Thermal interface uniformity and thermal resistance measuremnt system for LED engine)	1	set

A. General Description

- 본 장비는 ZHAGA LED 엔진 및 모듈에 대한 법규 및 열특성 측정을 목적으로 활용될 장비임
- 시스템을 구성하는 모든 요소는 ZHAGA 규격에서 요구하는 모든 조건을 만족해야 하며, 아래의 시험이 이루어질 수 있어야 한다. (시험실 환경 제외)
 - ZHAGA Book 1을 기본으로 Book 2에서 Book 11까지 해당되는 제품의 Thermal Interface에서 요구하는 모든 시험

B. General Specification

※ 아래 사양과 동등 또는 그 이상의 성능을 보유한 장비

ITEM	Specification	Quantity
Thermal power measurement System	<p>The system shall have the function to measure the thermal power generated by LED engine as transferred to its mounting platform as well as related parameters of LED power, temperatures and heat flux signal.</p> <p>The system shall meet all the requirement of Zhaga Book and relevant measures to calculates thermal power calculation and calibration.</p> <p>Thermal power measurement unit</p> <ol style="list-style-type: none"> Working range(W): Nominal max. 75W thermal power at 20°C cooling temperature Estimated max. 100W thermal power at 0°C cooling temperature Sensitivity S(nominal): 8 mV/W Heat flux sensor: analogue voltage Thermal resistance: 0.4K/W Internal heater resistance: 100 Ohms Temperature dependence of the heater: < +0.03%/ °C Heater max. power: 100W Frame dimension: 300 x 300 x 300 mm 	1set

	<p>9) Cylinder part dimension: Ø 100mm, height 80mm</p> <p>10) Initial calibration accuracy: $\pm 1\%$</p> <p>11) Cooling liquid indicator</p> <p>12) Thermal power measurement in W</p> <p>13) Thermal power calibration formula and data sheet has to be provided</p> <p>14) Engine mounting platforms</p> <p>15) TUTF JIG</p> <p>16) Rack and table for the system</p>	
Digital data acquisition and control unit	<p>1) Input signal: temperature(thermocouples, RTDs, thermistors), dc/ac volts, dc/ac currents, 2&4 wire resistance, frequency and period</p> <p>2) DC voltage</p> <ul style="list-style-type: none"> - Range: 100mV, 1V, 10V, 100V, 300V - Input resistance: 10MΩ or > 10KΩ (100mV, 1V, 10V), 10MΩ(100V, 300V) - A/D linearity: 0.0002% of reading + 0.0001 % of range <p>3) True RMS AC Voltage</p> <ul style="list-style-type: none"> - Range: 100mV, 1V, 10V, 100V, 300V - Input impedance: 1 MΩ \pm 2% in parallel with 150 pF - Crest factor : Maximum of 5:1 at Full Scale <p>4) Resistance</p> <ul style="list-style-type: none"> - Range: 100Ω, 1KΩ, 10KΩ, 100KΩ, 1MΩ, 10MΩ, 100MΩ - Measurement method: selectable 4-wire/2-wire Ohms, current source referenced to LO input - Offset compensation: Selectable on 100 Ω, 1 kΩ, 10 kΩ ranges - Maximum lead resistance: 10% of range per lead(100Ω and 1kΩ), 1kΩ(all other ranges) <p>5) DC current</p> <ul style="list-style-type: none"> - Range: 10mA, 100mA, 1A - Shunt resistance: 5Ω(10 mA, 100 mA), 0.1 Ω(1 A) <p>6) True RMS AC current</p> <ul style="list-style-type: none"> - Range: 10mA, 100mA, 1A - Shunt resistance: 5Ω(10 mA), 0.1 Ω(100mA, 1 A) <p>7) Thermocouple : B,E,J,K,N,R,S,T</p> <p>8) Thermistor: 2.2k, 5k, 10k</p> <p>9) RTD: $\alpha = 0.00385$ (DIN) and $\alpha = 0.00391$</p> <p>10) Input module: 2 wire armature(4 wire selectable), 60ch/sec, max \ 300V, max 1A, bandwidth 10Mhz, Thermal offset 3uV</p> <p>11) Interface: USB2.0 , LAN port, USB memory port</p> <p>12) Data Logging: PC based data logging software</p>	1set

Power Source for Correction Heater	1) Voltage output: 0-400V 2) Current output: 0-4A 3) Auto ranging: 4A/0-200V, 2A/200-400V 4) AC input: 90-250V 5) programming input / Monitoring output <ul style="list-style-type: none"> - input range: 0-5V / 0-5V - Accuracy: $\pm 0.5\%$ / $\pm 0.5\%$ - Offset: 0...+2.2mV(5V) / -1.1 ...0mV(5V) - Output impedance: $> 1M\Omega$ / 2Ω/ Amx. 4mA 6) Programming speed(10-90%) <ul style="list-style-type: none"> - Rise time: 0-200V(4ms/100%load, 2ms/10% load), 0-400V(8ms/100% load, 5ms/10% load) - Fall time: 200-0V(4ms/100%load, 42ms/10% load), 400-0V(15ms/100% load, 155ms/10% load) 7) Recovery time: 100us 8) Output impedance: $<0.18\Omega$ (CV, 0-1kHz), $<2\Omega$ (Cv, 1-100kHz) 9) Pulsating load: 0.4Arms($f>1kHz$), $f,1kHz(2/4A_{peak})$ 10) Accuracy: 0.5%+2d(0-400V), 2%+2d(0-4A) 11) Potentiometers & Encoder resolution: 0.03% 12) Remote shutdown: +5V, 1mA or relay contact\ 13) Regulation <ul style="list-style-type: none"> - CV: 10mV (load 0-100%), 2mV(line 120-265V) - CC: 0.5mA(load 0-100%), 0.2mA(line 120-265V) 	1set
Power Source & Meter for Test Samples	DC power source unit 1) Voltage output: 0-100V 2) Current output: 0-12.5A 3) AC input: 220V, 50-60HZ 4) Output ripple & noise: 60mV(CV p-p ²), 8mV(CV rms ³) 5) Load effect(change from 10% to 90%): 8mv, 7.5mA 6) Source effect(170-265 VAC input): 8mv, 3,25mA 7) Programming accuracy: 0.05%+30mv, 0.1%+12.5mA 8) Measurement accuracy: 0.1%+60mv, 0.1%+37.5mA 9) Load transition recovery time: $\leq 1ms$ 10) Output response time: 0.08s(up, full load), 0.08s(down, full load), 1.1s(down, no load) 11) remote sense compensation: 3V 12) Over voltage protection: 5-66V range , 0.6V accuracy 13) Programming resolution: 7.2mV, 1.5mA 14) front panel display accuracy: 0.3V, 0.0625A AC power source unit 1) Voltage output: 0-270Vrms	1set

	<p>2) Current output: 0-5Arms, 15Apeak 3) Max. power: 1KVA 4) Frequency range: 40-500Hz 5) Frequency accuracy: within $\pm 2 \times 10^{-4}$ 6) Voltage setting accuracy: 0.25% of full scale (270 V range) 7) DC mode out put: 2.8-380V, 4A, 800W, voltage setting accuracy 0.25% of full scale(270 V range) 8) Load regulation - 40 to 100 Hz: within ± 0.15 V/± 0.3 V - other frequencies: within ± 0.5 V/± 1 V 9) Measurement: Voltage, current, power, AC, DC, AC+DC 10) Measurement accuracy - Voltage: $\pm(0.5\%$ of reading + 0.3 V/0.6 V)/ 45 to 65 Hz and DC - Current: $\pm(0.5\%$ of reading + 0.04 A/0.02 A)/ 45 to 65 Hz and DC 11) Power accuracy - 45 to 65 Hz: $\pm(2\%$ of reading + 1 W) - DC: $\pm(2\%$ of reading+W+0.04 W/0.02 W per DC) 12) Interface: LAN(IEEE 802.3 100Base-TX or 10Base-T Ethernet), USB 2.0(12Mbps data rate/full speed)</p> <p>Infrared Camera</p> <p>1) Temperature range : -20°C to 650°C 2) Zoom : 4X 3) Multi spectral Dynamic Imaging : IR Image 4) Frame rate : 60Hz 5) Automatic manual 6) Thermal sensitivity : <0.045°C at 30°C 7) Detector type : 320x240 8) Display : Built-in 3.5" color LCD 9) Measurement model : 5 spotmeters, 5 box areas, Auto hot/cold spot Delta T 10) Spectral range : 7.5 to 13um</p>	
Cooling water Supply	<p>Temperature control</p> <p>1) Working temperature range: -25°C-150°C 2) Operating condition: 5°C-40°C, 50-80 %RH 3) Temperature stability: 0.05°C 4) Controller: PID controlled microprocessor touch pad 5) Sensor: PT 100 6) Heater: 2000W, 220VAC 7) Controller function: Auto tuning, 3-point temperature calibration, wait/on-off timer(max. 99hr)/auto-run, pump speed adjustment 8) Cooling capacity(W): 320 to 20°C, 230 to 0°C, 80 to -20°C 9) Max. pressure(psi)/max. flow rate(l/m): 0.5/5.6, 1.1/8.0. 2.4/12.8, 4.9/18.8, 5.9/28.0</p>	1set

	10) Internal/external material: stainless steel 1.0t / steel, 1.2t, double painted and baked 11) Insulation: Polyurethane foam 30mm 12) Control panel: Digital VFD, 3 buttons, 1 dial knob 13) Interface: RS232C, USB 14) Safety device: CLS(Custom Logical Safe)- Control System, Over Temp. Limiter, Low Level Limiter 15) Software: control, test results storage 16) Mobile application: real time monitoring 17) Silicon tubes 18) CE approval & CFC free	
Software	1) Complete software system for control of hardware, data acquisition, flexible test routines, data evaluation 2) The software for test, with English user interface, should perform test fulfilling relevant standards ZHAGA regarding measuring lighting device. The software should be able to control all of functions automatically. - Correction Heater Power for Tr - External power source - Multimeter & Recorder - Cooling water supply(Tcooling) 3) The test report generated by the software should have the format according relevant standards. Pth,rear and Rth,rear should be calculated using S/W automatically. The title of the report should be editable (including information such as, name of test sample, type, test item, status of the sample etc.) 4) The test control software should be user-friendly, easy to understand and operate. 5) The software should be able to archive all test report with the search function that user could search for any test report by its name and test date. 6) The measured data obtained should be exported in excel and pdf format for use in simulation programs.	1set
Computer System	1) CPU: Intel Core i7 (3.4GHz) 2) RAM: 32GB DDR4 3) 1 st HDD 512 GB SSD SATA 4) 2 nd HDD 2TB SATA 7200RPM 5) External HDD 2TB*3EA 6) Window 10 (Korean) 7) Graphic 8GB NVIDIA GTX 1070 8) Main board ASUS MAXIMUS Z170 (PCI-EXPRESS 3.0 x 16)	1set

	9) monitor dual (2ea) : 27`` 10) Wireless Mouse, Key Board & Speaker 11) Laserjet Color Printer 12) Workstation Table & Chair 13) Additional License Key (s/w) + Portable control system (Intel/Core M/Skylake/12inch)	
Accessory	1) TEST JIG and ADAPTER PLATE for LED Module and Engine 2) High Conductive Thermal Paste (3ea) 3) Omega Thermocouple wire (K type, J type) 1000ft 2ea (each)	-
Mounting, Instructions, Training	1) Mounting, installation, adjustment, calibration, and performance tests at place of installation 2) Training in use of the system over 3 days.	1set
Delivery	within 4 months after purchase order	

C. Remarks

- 보증기간 : 설치 검수 완료일로부터 2년
- 매뉴얼 : 영문, 국문 각 3부
- 광학표준기기 및 기타 기기(전력분석기, 전압공급기 등 교정대상 모든 장비)는 공인시험 및 교정기관의 인증서(Certificate)를 제출
- 입찰시 최근 3년간 동일 시스템을 국외 NCB 또는 NVLAP 공인시험기관에 납품한 실적 1건 이상 증빙서류(동일시스템에 대한 구매계약서, 납품확인서, 세금계산서 사본 등 객관적으로 검증 가능한 자료 제출)
- 제품공급자에 의한 설치 및 교육 실시
 - 보증기간 내 2회 이상 현장 방문 교육 무상 제공 (설치 후 교육 제외)
- 제품의 품질 보증 및 A/S의 원활한 지원을 위해 장비에 문제가 발생하였을 경우 문제 접수 후, 24시간 이내에 대처하며, 해결이 지연되는 경우 7일 이내에 동일 사양의 Back up 장비를 무상 제공하는 A/S 시스템을 지원하여야 한다.
- 제품공급자는 제품전달시 아래사항을 준수
 - 실험 장치에서 구동프로그램이 있는 경우, 시스템 및 교육용 소스를 모두 제공할 것
 - 사용자가 지정한 장소까지 운송/이동 및 설치하여 줄 것
 - 사용자에 의한 최종 검수 보고서 발행 시까지 납품을 완료 할 것
- 외주 방지
 - 제작을 직접 하지 않는 것이 밝혀질 경우 발주를 취소하고 손해배상을 청구한다.
(향후 한국조명연구원 모든 입찰 배제)
 - 제작과정을 수시로 제출
(사진, 메일, 팩스 등 제작 과정이 순조롭게 진행되는 것을 확인 할 수 있도록 할 것)
- 장비 입고에 대한 세부 일정 작성
 - 일정에 맞춰 방문 점검(주요 자재 입고 및 장비 조립 시)
- 장비 설치 완료일 : 11월 11일 이내
(검수과정에서 물품에 이상이 발견될 경우 지체일수에 산입하며, 규격서에서 요구하는 사양을 만족하지 못할 경우 계약을 취소하고 손해배상을 청구한다.)