



327 Campus Drive, Aurora, Ohio 44202 Phone: 330-995-1335 Fax: 330-995-1343

Test Report

PO Number : AIT-2154

SUBMITTED TO

Digital Lighting Inc.
3620 Vireo Ave
Santa Clara, CA 95051

Customer Information

Requestor's Name Choong Weng Onn Company Name Digital Lighting Inc.

Address 3620 Vireo Ave

City Santa Clara Telephone: _____

State CA Fax: _____

Zip Code 95051 Email: choong@itramas.com

Date of Receipt: 11/20/09 Date of this Report: 11/23/09

This Test Report covers the Lamp Model Numbers shown below:

Test No	Manufacturer	Model Number/Lamp markings
AIT 2154-1	ItraMAS	QMR16 USN 27G533

At the customer's request this report has been generated to provide test data for the following tests: Electrical, photometric and colorimetric tests. The tests as requested are in compliance with ISO 17025. Aurora International Testing Laboratory is only responsible for the validity of the test data. The test results relate only to the lamps tested.

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U.S. Department of Energy
Lighting Facts^{CM} Uniform LM-79 Reporting Template



Laboratory Information

Name of test lab	Aurora International Laborartoy
Date of test report	11/23/2009
Test report number	AIT-2154
Laboratory contact name	Joe Marella
Laboratory contact signature*	<i>Joe Marella</i>

* By signing this form, the signatory is attesting that the information on the form is correct and the same as on the original, complete test report(s). The signatory also attests that all of the results on this form were measured entirely in accordance with IES LM-79-08.

Product Information

Manufacturer	Digital Lighting Inc.	
Brand name	Q-Ray	
Model number	QMR16 USN 27G533	
SKU (if available)		
Type of luminaire (for integral lamps, list base type and lamp type)	GU5.3, MR16 Reflector	
Luminaire aperture (downlights)		in.
Luminaire length		in.
Luminaire width		in.
Number of units (modular products)		

Electrical Measurements

	Integrating sphere output	Goniophotometer output	
Input wattage	3.30		W
Input current	0.414		A
Input voltage	11.99		V
Power factor	0.665		
Off-state power			W

Photometric Characteristics

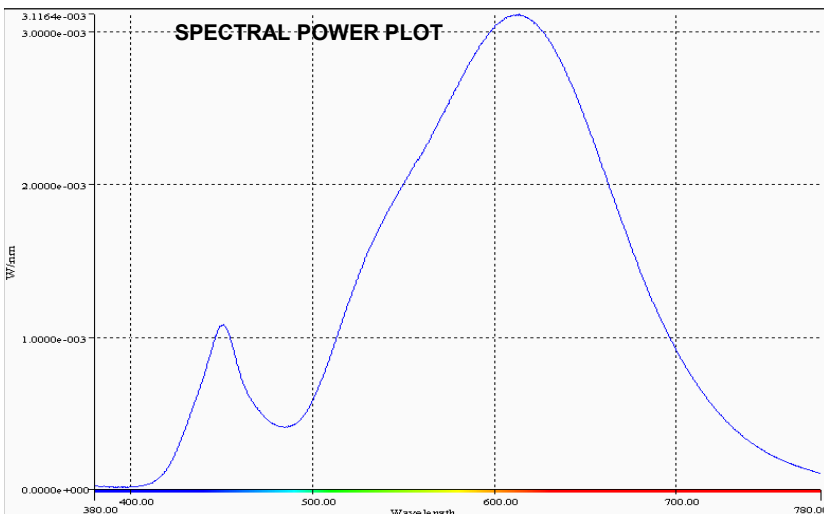
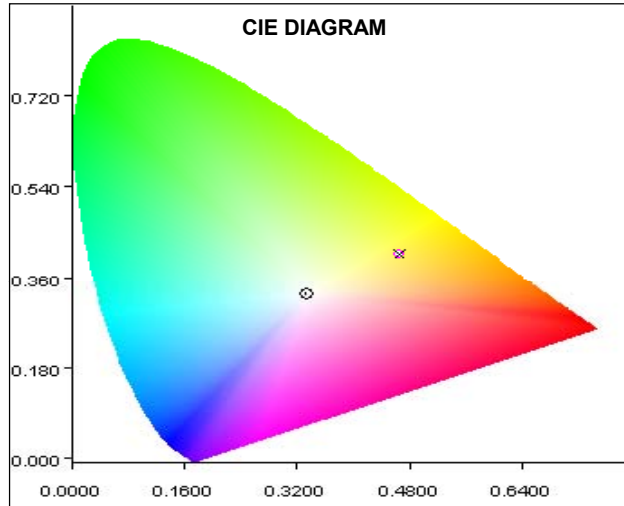
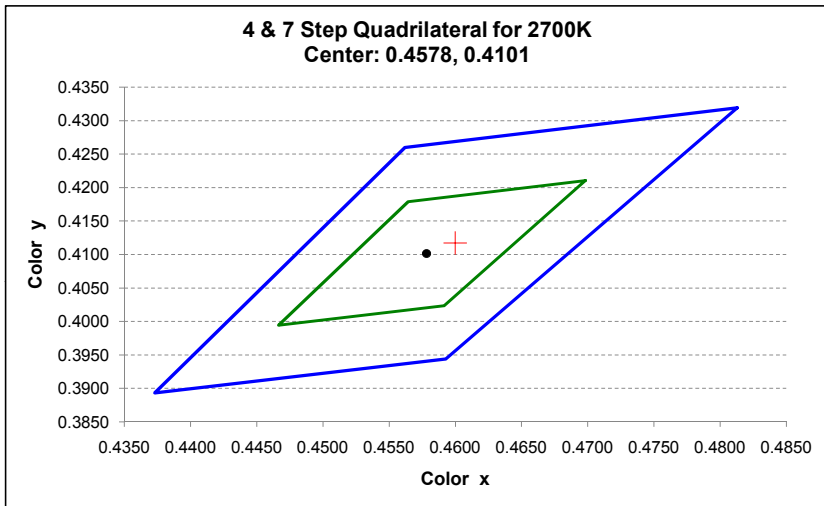
Total initial lumen output	152		lm
Initial luminaire efficacy	46.1		lm/W
Correlated color temperature / CCT	2706	K	
Color rendering index / CRI	82		
R ₉ value	23.24		
Duv	0.0004		

Luminous Intensity Distribution

		Goniophotometer output	
Center beam candlepower (if applicable)			cd
Beam angle (if applicable)			°
Zonal lumens in the 0°-60° zone			%
Zonal lumens in the 60°-90° zone			%
Zonal lumens in the 90°-120° zone			%
Zonal lumens in the 120°-180° zone			%

RESULTS

Lp. #	Volts	Amps	Watts	pf	Lumens	CCT	CRI	R _g	Sph Temp	x Value	y Value	u' Value	v' Value	Duv	4-Step Color Compliance	7-Step Color Compliance	LPW
AIT-2154-1 QMR16 USN 27G533	11.99	0.4140	3.30	0.665	152	2706	82	23.24	76.2	0.4600	0.4117	0.2621	0.5278	0.0004	PASS	PASS	46.1





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The following standards and specifications were used in part or totally for each test sample:

1. IES NA LM 16 -1995 Practical guide to Colorimetry of Light Sources
2. IESNA LM-58 : Spectroradiometric Measurements
3. IES NA LM79:2008 (Sections 9 & 12) Approved Method: Electrical and Photometric Measurements of Solid State Lighting Products
4. ANSI C78.377-2008: Specifications for the Chromaticity of Solid State Lighting products
5. ANSI Chromaticity Final PC.xls Worksheet
6. CIE Publication 13.3:1995 Method of Measuring and Specifying Color Rendering Index
7. CIE Publication 15:2004 Method of Measuring and Specifying Color Rendering Index

TEST METHODS

Electrical Photometric and Colorimetric Measurements

Total light output (luminous flux) was measured using an integrating sphere, a spectroradiometer and software. The spectral luminous flux measurements were made using the spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Each lamp was operated in the designated orientation at 12 volts AC. Each lamp preburned for 5 hours on a test rack adjacent to the sphere. After transfer to the sphere the lamps were allowed to stabilize before measurements were made. The chromaticity coordinates, correlated color temperature and color rendering index for each lamp are calculated from the spectral radiant flux measurements taken at 0.4 nm intervals over the range of 380-780 nm. The calibration of the sphere spectroradiometer system is traceable to the National Institute of Standards and Technology. Electrical measurements including voltage, current, power and power factor are measured using a power analyzer. The ambient temperature condition inside the sphere was maintained at 77 °F ± 1.8 °F and was measured at a position inside the sphere.

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Equipment List :

Description	Manufacturer	Model
1.0 Meter Integrating Sphere	Everfine	Spektron
1.5 Meter Integrating Sphere	Everfine	Spektron
AC Power Source	California Instruments	2001L
Spectroradiometer	Optronics Laboratories, Inc.	OL770
Radiometer/Photometer	Optronics Laboratories, Inc.	OL730/CV
Power Analyzer	Yokogawa, Inc.	WT210
High Voltage DC Power Source	Xantrax	XHR 150-7
Programmable DC Power Source	Optronics Laboratories, Inc.	65A
Programmable DC Power Source	Optronics Laboratories, Inc.	83A
Digital Thermocouple Meter	Fluke	54
Precision shunt	Guildline	9230A-30-0.1
6 1/2 Digit Multimeter	Agilent	34401A
Lamp Reference Standard	GE	100watt, 120volt
Oscilloscope	Yokogawa, Inc.	DL1520L
EMC Transient Test System	KeyTek	EMC Pro
Preburn test rack	AITL	na
Life Test rack	AITL	na
Rapid Cycle Test rack	AITL	na
Draft free enclosure	AITL	na
Thermal chamber	ESPEC	LU113
Elevated Temperature Life Test Rack	AITL	na
PC	Dell	various

Testing Technician: John Liscio Date: 11/23/09

Approved Signatory: Joseph Marella Date: 11/23/2009

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