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Report No. 103379350CRT-002

Shanghai Nanhua Electronics Co., Ltd.

Building #9 1755 Wenbei Road, Jiading Shanghai 201802 China

Standards

International Civil Aviation Organization (ICAO), Aerodromes, Annex 14, Volume 1, Sixth Edition, dated July 2013

Test Purpose	ICAO Photometry and Chromaticity Performance Testing
Test Dates	February 28th 2018 through March 12th 2018
Revision Note	Client address updated

ron R. Bell

Daron R. Bell Project Engineer Lighting

Christopher W. Metcalf Engineering Supervisor Lighting

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	Test Plan and Datasheets								
Client	Shanghai Nanhua Electronics Co., Ltd.	Engineer	Daron R. Bell						
Report #	103379350CRT-002	Reviewer	Christopher W. Metcalf						
Product	Medium Intensity Type B	Model(s)	LT864						
Standard	ICAO Anne	ex 14, datec	July 2013						

Spec	Test name	Clause	Pass Fail NA
ICAO	Photometry Low Intensity Type A	Table 6-1	NA
ICAO	Chromaticity ICAO App. 1 2.2.1	2.1.1	NA
ICAO	Photometry Medium Intensity Type B	Table 6-3R	Pass
ICAO	Chromaticity ICAO App. 1 2.2.1	2.1.1	Pass

	Sample Information								
Date Rec.	Intertek ID	Description	Condition	Model No.					
2/14/18	CRT1802141509-001	LT864 Medium Intensity Type B	Production	1000117-001					

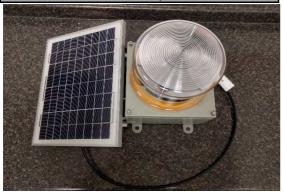
	Further Sample Description						
Type:	Medium Intensity Type B						
Class:	NA						
Mode:	NA						
Style:	NA						
Options:	Solar Panel						
Light Source:	18 x CREE Model XPEBRD						
Filter:	Polycarbonate						
Diameter:	6.75"						
Electrical Input:	12.0 VDC 3 A (Supplied by client)						
Casting Material:	Aluminium						
Yield Device:	NA						
Mounting:	NA						



LT864 Side



LT864 Top



Picture(s)









Photometry Medium Intensity Type B (Red)

Energize the light by the system power supply and control unit and test for compliance with the photometric requirements in Table 6-3. Vary the input voltage to the light \pm 10% from nominal voltage and measure the effective intensity at the input extremes. Make the effective intensity measurements using an integrating photometer whose calibration is traceable to an NIST steady state source. The test distance is 25 meters. The horizontal beam spread is 360 degrees.

Results

ICAO Medium-Intensity, Type B (Red Night) Table 6-3 Minimum Requirements Mode Parameter Requirement Measured Result Red Min. Avg. Intensity 20.00 cd at 0° 2204 cd Pass Min. Avg. Intensity 1.500 cd at 0° 2204 cd Pass Min. Peak Intensity 1.500 cd at 0° 2204 cd Pass Beam Spread 23° at each vertical slice (min 750cd) 3.5 degrees Pass Mode Parameter Requirement Measured Result Might Max. Intensity 1.25 cd at -1° 1996 cd Fail Might Max. Intensity 1.25 cd at -1° Minimum Cable Length Max. Intensity 1.25 cd at -1° Voltage Variation Voltage Positon Measured Factor Min. Avg. Int. 2,000cd @ 0° Min. Factor Min. Avg. Int. 2,500 cd at Result 1903 cd Result Input Voltage +10% 13.2 0,0 9970 100% 2200 cd Result <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th><u>.</u></th><th></th></td<>												<u>.</u>	
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Red Night Flash Rate (FPM) 20-60 FPM 20 FPM Pass Pass Min. Avg. Intensity 2,000 cd at 0° 1903 cd Pass Pass Min. Peak Intensity 1,500 cd at 0° 1903 cd Pass Pass Min. Peak Intensity 2,500 cd at 0° 1007 cd Pass Pass Beam Spread 23° at each vertical slice (min 750cd) 3.5 degrees Pass Pass Mode Parameter Result Measured Result Max. Intensity 1,125 cd at -1° 1896 cd Fail Max. Intensity 75 cd at -10° 13 cd Pass Voltage Variation Voltage Position Measured Factor Min. Avg. Int. 2000cd @ 0° Min. Not 1, 500cd @ 0° Input Voltage 12.0 0, 0 9960 NA 2200 cd Result 1903 cd Result Input Voltage +10% 13.2 0, 0 9940 100% 2200 cd Pass 1905 Cd Pass				Та	ble 6-3 Mi	nimum Re	equireme	nts					
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Mode	Paramete	r	Requirem	ent				Mea	sured	Result		
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Night Min. Peak Intensity 1500 cd at 0° 1903 cd Pass 1007 cd Pass Pass Beam Spread 23° at each vertical slice (min 750cd) 3.5 degrees Pass Mode Parameter Requirement Measured Result Max. Intensity 2,500 cd at 0° 2718 cd Fail Max. Intensity 1,125 cd at -1° 1896 cd Fail Max. Intensity 1,125 cd at -10° 13 cd Pass Voltage Variation Voltage Position Measured Factor Mux. Intensity 75 cd at -10° 13 cd Pass Voltage Variation Voltage Position Measured Factor Input Voltage +10% 13.2 0, 0 9960 NA 2207 cd Pass 1905 cd Pass Input Voltage +10% 13.2 0, 0 9970 100% 2200 cd Pass 1905 cd Pass Input Voltage +10% 10.8 0, 0 9940 100% 2200 cd Pass 1899 od Pass Input Voltage +10% 10.8 0, 0 9940 100% 2200 cd Pass 1892 od	Pod	Min. Avg.	Intensity	2,000 cd a	at 0°				2204	cd	Pass		
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3D 104 89 261 350 115 61 55 262 128 245 200 227													
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 Complies:
 YES
 NO

 Tested By:
 Matthew Benninger
 Signature or initials:
 M?
 Comp. Date

 Reviewed By:
 cwm
 Signature or initials:
 M?
 Comp. Date

 Test Equipment Used:
 1,2,3,4
 Sample:
 CRT1802141509-001

30%

RH%

Amb (°C):

22

2/28/18

Chromaticity ICAO + CAR

Test the fixture with the lamp, filter and optical system for color of light emitted. Chromaticity Coordinates are to be calculated from a spectral distribution measured in 2nm increments for LEDs, and 5nm increments for incandescent. Measure the color after stabilization at rated input at the main beam center and beam extremes.

Results - ICAO Red

Sample	Color	Input	Measured	Location	Х	у	Z	(P/F)
				(0,1.5)	0.677	0.323	0.000	Р
CRT1802141509-001	Red	12Vdc	12.000Vdc	(0,0)	0.676	0.323	0.000	Р
				(0,-1)	0.664	0.323	0.013	Р

The aviation red must be per ICAO Annex 14, Volume 1, Appendix 1, Colors for Aeronautical Ground Lights, within the following chromaticity boundaries

Boundary	Line Equation	Calc.
Purple Boundary	y ≥ 0.980 - x	0.303
Yellow Boundary	y ≤ 0.335	0.323

Complies: 🗸 YES	NO			
Tested By:	Craig Small			Signature or initials: Comp. Date 3/12/18
Reviewed By:	cwm			Signature or initials:
Test Equipment Used:	6,7,8,9,10,1	1		
Amb (°C):	24.5	RH%	18.5	

Report No.: 103379350CRT-002 Client: Shanghai Nanhua Electronics Co., Ltd. Standard: ICAO Annex 14, dated July 2013

Equipme	nt list			
#	Intertek ID No.	Description	Manufacturer	Calibration Due
1	O109	Goniometer	Optronik	04-Oct-2018
2	O114	5M Photometer	Optronik	22-Oct-2018
3	O113	Power Supply	Optronik	13-Apr-2018
4	T1555	Hygro-Thermometer	Extech	16-May-2018
5	M292	OL750S	Gooch & Housego	26-Sep-2018
6	E288	OL-750 Spectroradiometer	Optronic Labratories	20-Mar-2018
7	M282	Hygrometer	Testo	08-Apr-2018
8	E536	Digital Power Meter	Yokogowa	19-Jan-2019
9	N721	Steel Ruler	Products Engineering Corp	12-Jul-2019
10	N1335	Tape Measure	Stanley	16-May-2019
11	E499	Digital Level	Smart Tool	22-Jun-2018
12				
13				
14				
15				
16				
17				
18				
19				
20				
ote: For m	easurement uncertainty,	refer to the calibration certificates for	or all the test equipment located in th	e equipment files