



The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, TE Connectivity (TE) makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, TE may change these requirements based on the results of additional testing and evaluation. Contact TE Engineering for further details.

## **LUMAWISE Drive LED Holder Type Z50**

### **1. SCOPE**

#### 1.1. Content

This specification covers performances, tests and quality requirements of the LUMAWISE Drive Type Z50 Platform with part numbers x-2213699-y and x-2316510-y, applied according application specification 114-133086.

Prefix 'x' defines different output currents and suffix 'y' defines COB size versions.

#### 1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

#### 1.3. Qualification Test Results

Successful qualification testing on the subject product line has not been completed. The Qualification Test Report number will be issued upon successful qualification testing.

### **2. APPLICABLE DOCUMENTS AND FORMS**

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

#### 2.1. TE Documents

- C-2213699: Customer Drawing On/off version
- C-2316510: Customer Drawing 0-10V version
- 114-133082: Application Specification
- 501- 19243: Qualification Test Report
- 502-153154 EMC Test report
- 503-153200: LUMAWISE Drive LED Holder Type Z50 230 V ac test
- 503- 133082-1: LUMAWISE Drive LED Holder Type Z50 – Dimming and Flicker tests
- 503- 133082-2: LUMAWISE Drive LED Holder Type Z50 – Electrical tests
- 503- 133082-3: LUMAWISE Drive LED Holder Type Z50 – Tc temperature recording
- 503- 133082-4: LUMAWISE Drive Type Z50 – Software validation V005
- 503- 133082-5: Proper fit of CoB in holders
- 503- 133082-6: Software robustness

#### 2.2. Industry Documents

- UL 8754: UL Standard for Safety Holders, Bases, and Connectors for Solid-State (LED) Light Engines and Arrays.  
UL file: E46927, Vol 1;2
- UL 8750 Light Emitting Diode (LED) Equipment for Use in Lighting Products.  
UL file: E46927, Vol 1;2
- IEC 60838-2-2: Miscellaneous lamp holders – Part 2-2: Particular requirements – Connectors for LED-modules

Dekra certificate number: NL-48427

- IEC 61347-2-13 Lamp controlgear - Part 2-13: Particular requirements for d.c. or a.c. supplied electronic controlgear for LED modules  
Dekra certificate number: NL-48427
- IEC EN 61547: Equipment for general lighting purposes – EMC immunity requirements
- CISPR 15: Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
- EN 55015: Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
- FCC Title 47, part 15, subpart B: Unintentional Radiators

### 3. REQUIREMENTS

#### 3.1. Design and Construction

Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

#### 3.2. Ratings

The LED holders must be stored in a temperature range of -20 to 60°C [-4 to 140°F] and used within 1 year from the date code located on the bottom of the holder.



**NOTE**

The maximums for energy presented here are independent of each other. It is not possible to meet two of them without violating the third one.

Part number	Typical Output Voltage	Output range Voltage	Nominal Output Current	Functionality
0-2213699-y	36 V dc	25 V dc to 41 V dc	0.35 A	On/off
1-2213699-y			0.5 A	
2-2213699-y			0.7 A	
3-2213699-y			1.05 A	
0-2316510-y	36 V dc	25 V dc to 41 V dc	0.35 A	0-10 V
1-2316510-y			0.5 A	
2-2316510-y			0.7 A	
3-2316510-y			1.05 A	

**Table 1**

*Note: Suffix 'y' defines LED size versions, see Customer Drawing for definitions.*

#### 3.3. Input safety

LUMAWISE Drive LED Holder Type Z50 shall fail in a safe way when 230 V ac is applied on any of the lines.

See test report 502-153200.

#### 3.4. Sink and source dimming test

LUMAWISE Drive LED Holder Type Z50 must be capable to be controlled by a 0 to 10 V source signal. LUMAWISE Drive LED Holder Type Z50 must be capable of delivering minimum amount of current on the control lines.

See test report 503-133082-1 LUMAWISE Drive LED Holder Type Z50 – Dimming and Flicker tests.

#### 3.5. dB measurement

LUMAWISE Drive LED Holder Type Z50 shall not product any noise over 36 dB

See test report 503-133082-1 LUMAWISE Drive LED Holder Type Z50 – Dimming and Flicker tests.

#### 3.6. Thermal rating (maximum allowed operating temperature)

The Tc point as defined in the Application Specification (114-133082) should not exceed 110 °C

See test report: 503-133082-3: LUMAWISE Drive LED Holder Type Z50 – Tc temperature recording

#### 3.7. Input Voltages

LUMAWISE Drive LED Holder Type Z50 shall function within  $\pm 10\%$  of the 48 V input voltage.

See test report: 503-133082-2: LUMAWISE Drive LED Holder Type Z50 – Electrical tests

#### 3.8. Efficiency

LUMAWISE Drive LED Holder Type Z50 shall function in optimum state with efficiency of minimum of 94 %.

See test report: 503-133082-2, LUMAWISE Drive LED Holder Type Z50 – Electrical tests

#### 3.9. Reverse polarity

LUMAWISE Drive LED Holder Type Z50 shall not be damaged when input and control lines are wrongly connected or CoB polarity has not been observed.

See test report: 503-133082-2, LUMAWISE Drive LED Holder Type Z50 – Electrical tests

#### 3.10. Output current

LUMAWISE Drive LED Holder Type Z50 output current shall not exceed  $\pm 5\%$  when operating with in limits of the input voltage (48 V  $\pm 10\%$ ).

See test report: 503-133082-2, LUMAWISE Drive LED Holder Type Z50 – Electrical tests

#### 3.11. Safe failing

LUMAWISE Drive LED Holder Type Z50 shall not smoke, burn or produce harmful gasses when failing short circuit or running without heatsink.

See test report: 503-133082-2, LUMAWISE Drive LED Holder Type Z50 – Electrical tests

#### 3.12. Voltage cut-off

LUMAWISE Drive LED Holder Type Z50 shall turn off when input voltage is lower than 40 V.

See test report: 503-133082-2, LUMAWISE Drive LED Holder Type Z50 – Electrical tests

#### 3.13. Recording of over temperature and amount of over temperature

LUMAWISE Drive LED Holder Type Z50 shall record and store over temperature events. The first three and last 17 events will be stored

See test report: 503-133082-4, LUMAWISE Drive Type Z50 – Software validation V005

#### 3.14. Software reaction time

LUMAWISE Drive LED Holder Type Z50 independent of the version when power on shall have a soft start-up of maximum 100 ms to full output power.

See test report: 503-133082-4, LUMAWISE Drive Type Z50 – Software validation V005

3.15. Software robustness

See test report: 503- 133082-6.

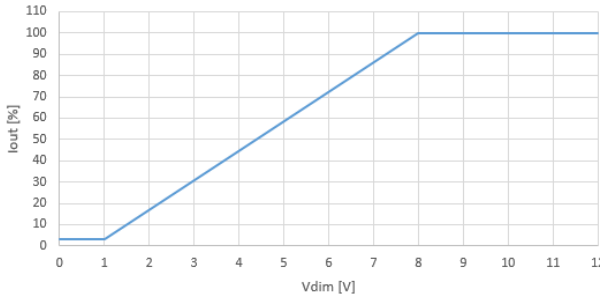
3.16. Proper fit of COB

See test report 503-133082-5: LUMAWISE Drive LED Holder Type Z50 – COB fit

3.17. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Examination of product	Meets requirements of product drawing.	Visual, dimensional, and functional inspection per quality inspection plan and EIA-364-18B/IEC 60512-1-1
<b>ELECTRICAL</b>		
Drive efficiency	≥ 93% efficiency. Test with resistor-load.	Fixed 48 V dc input power, resistor controlling 36 V dc output. For resistor values see figure 3
Forward Voltage to LED	Typical output voltage between 25 V dc – 41 V dc. Range will be tested on 25 V dc, 36 V dc and 41 V dc. Test with resistor-load.	The samples shall be powered with 48 V -1 % dc and 10 V dc on the control lines, the LED-load is simulated with a resistor. Voltage is measured between the LED contacts. For resistor values, see figure 3.
Output Current	Typical output current should be within a tolerance of ± 5%. Test will be done on the highest output current, 1050 mA. Test with resistor-load.	The samples shall be powered with 48 V dc and 10 V dc on the control lines, the LED-load is simulated with a resistor. Current is measured between the LED contacts with the resistor in series. For resistor values, see figure 3.
Dimming Curve Output Current	Typical output current with 10, 8, 5, 1 and 0.5 V dc on control lines, this should represent 100, 50 and 1 % light output. Should comply with theoretical dimming curve of the figure below. Test with LED-load.	The samples shall be powered with 48 V dc and 10 V dc on the control lines, the LED-load is simulated with a resistor. The control lines will be powered with the dedicated voltage as noted in the requirement area. Current is measured between the LED contacts with the resistor in series.

	<p style="text-align: center;">LUMAWISE Drive Type Z50 LED Holder - Dimming Curve</p> 	For resistor values, see figure 3.
65 V dc input (all lines)	LUMAWISE Drive Z50 still works after 65 V dc is applied. Test with resistor-load.	65 V dc on the data and power lines: <ol style="list-style-type: none"> <li>1. 65 V dc to P1 and ground to P2</li> <li>2. 65 V dc to P3 and ground to P2</li> <li>3. 65 V dc to P2 and ground to P1</li> <li>4. 65 V dc to P2 and ground to P3</li> </ol>
Output flicker	No flicker percentage higher than 5 % shall occur. Measured at 100% output and 20% output. Test with LED-load.	IESNA lighting handbook flicker percentage. Flicker index to be recorded.
ESD immunity	Test level per IEC61547: Air discharge level: 8 kV Contact discharge level: 4 kV Pass Criteria B	IEC61000-4-2 10 discharges per location for each polarity.
Radiated immunity	Test level per IEC61547: Field Strength: 3 V/m Freq. Range: 80-1000MHz Modulation: 1kHz, 80% AM, sine wave Pass Criteria: A	IEC 61000-4-3 The DUT including supporting equipment is placed 0.8m above ground within an anechoic test chamber. Distance antenna to DUT: 3m
Fast transient/Burst immunity	Test level per IEC61547: Signal, data and control lines: $\pm 0.5$ kV DC Power Supply lines: $\pm 0.5$ kV Tr/Th: 5/50ns Repetition rate: 5kHz Duration: $\geq 2$ min per polarity Pass Criteria: B	IEC61000-4-4 Injection via coupling network (33nF). Both positive and negative polarity discharges shall be applied.
Injected currents	Test level per IEC61547:	IEC61000-4-6

	<p>Frequency range: 0.15-80 MHz          Field strength: 3 V rms.          Modulation: of 1 kHz.</p> <p>Pass Criteria: A</p>	<p>The Frequency range shall be swept with a modulated signal. The rate of sweep does not exceed <math>1.5 \times 10^{-3}</math> decade/s.</p> <p>The dwell time at each frequency shall be not less than the time necessary for the DUT to be able to respond.</p> <p>Test is applicable for all DC supply lines and for signal lines longer than 3m.</p> <p>Coupling method: coupling / decoupling network (CDN) preferred.</p>																																					
<p>Disturbance voltage limits</p>	<p>Test with LED-load.</p> <table border="1" data-bbox="479 793 1101 1041"> <thead> <tr> <th colspan="3">Disturbance voltage limits at power inlet (DC) terminals</th> </tr> <tr> <th rowspan="2">Frequency range</th> <th colspan="2">Limits dB(<math>\mu</math>V)<sup>a</sup></th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>9 kHz to 50 kHz</td> <td>110</td> <td>--</td> </tr> <tr> <td>50 kHz to 150 kHz</td> <td>90 to 80</td> <td>--</td> </tr> <tr> <td>150 kHz to 0.5 MHz</td> <td>66 to 56</td> <td>56 to 46</td> </tr> <tr> <td>0.5 MHz to 5 MHz</td> <td>56</td> <td>46</td> </tr> <tr> <td>5 MHz to 30 MHz</td> <td>60</td> <td>50</td> </tr> </tbody> </table> <table border="1" data-bbox="479 1062 1101 1226"> <thead> <tr> <th colspan="3">Disturbance voltage limits at control terminals</th> </tr> <tr> <th rowspan="2">Frequency range</th> <th colspan="2">Limits dB(<math>\mu</math>V)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15 to 0.50 MHz</td> <td>84 to 74</td> <td>74 to 64</td> </tr> <tr> <td>0.50 to 30 MHz</td> <td>74</td> <td>64</td> </tr> </tbody> </table>	Disturbance voltage limits at power inlet (DC) terminals			Frequency range	Limits dB( $\mu$ V) <sup>a</sup>		Quasi-peak	Average	9 kHz to 50 kHz	110	--	50 kHz to 150 kHz	90 to 80	--	150 kHz to 0.5 MHz	66 to 56	56 to 46	0.5 MHz to 5 MHz	56	46	5 MHz to 30 MHz	60	50	Disturbance voltage limits at control terminals			Frequency range	Limits dB( $\mu$ V)		Quasi-peak	Average	0.15 to 0.50 MHz	84 to 74	74 to 64	0.50 to 30 MHz	74	64	<p>CISPR 15 / EN 55015</p> <p>Frequency range of 150 kHz to 0.5 MHz.</p>
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<p>Radiated disturbances</p>	<p>Test with LED-load.</p> <p>Table 3b – Radiated disturbance limits in the frequency range 30 MHz to 300 MHz at a measuring distance of 10 m</p> <table border="1" data-bbox="488 1350 1091 1455"> <thead> <tr> <th>Frequency range MHz</th> <th>Quasi-peak limits dB(<math>\mu</math>V/m)<sup>a</sup></th> </tr> </thead> <tbody> <tr> <td>30 to 230</td> <td>30</td> </tr> <tr> <td>230 to 300</td> <td>37</td> </tr> </tbody> </table> <p><small>* At the transition frequency, the lower limit applies.</small></p> <p>CDN method:</p> <table border="1" data-bbox="479 1514 1101 1646"> <thead> <tr> <th>Frequency range</th> <th>Quasi-peak limits dB(<math>\mu</math>V)<sup>a</sup></th> </tr> </thead> <tbody> <tr> <td>30 to 100 MHz</td> <td>64 to 54<sup>**</sup></td> </tr> <tr> <td>100 to 230 MHz</td> <td>54</td> </tr> <tr> <td>230 to 300 MHz</td> <td>61</td> </tr> </tbody> </table>	Frequency range MHz	Quasi-peak limits dB( $\mu$ V/m) <sup>a</sup>	30 to 230	30	230 to 300	37	Frequency range	Quasi-peak limits dB( $\mu$ V) <sup>a</sup>	30 to 100 MHz	64 to 54 <sup>**</sup>	100 to 230 MHz	54	230 to 300 MHz	61	<p>CISPR 15 / EN 55015</p> <p>Frequency range of 30 MHz to 300 MHz.</p>																							
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MECHANICAL		
TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Vibration	No physical or functional damage.	EIA 364-28 / IEC 60512-6-4/-5 Vibration frequency: 20 to 500 Hz, 3.10 g peak. Vibration direction: 3 mutually perpendicular directions Duration: 15 minutes each
Mechanical Shock	No physical or functional damage.	EIA 364-27, Test Condition H / IEC 60512-6-3 Accelerated velocity: 30 G half sinusoidal shock pulses Number of shocks: 3 in each direction applied along 3 mutually perpendicular directions with 18 total shocks.

ENVIRONMENTAL		
TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Thermal cutout test	Driver should switch back to an output current of 105 mA (based on the 1050 mA version -10%). Test with LED-load and software version V004. Note: In Release software this cut-out changes to a switch back of 20% dim level.	Running the LUMAWISE Drive above 110 °C measure at the Tc.
Thermal shock	See note.	EIA-364-32, Test Condition VIII / IEC 60512-11-4 Subject specimens to 25 cycles between -40 °C and 105 °C with 30-minute dwells at temperature extremes and 1-minute transition between temperatures.
Contact normal force relaxation	Normal force should be at least 0.5 N at maximum deflection for LED contact and at least 0.2 N on the PCBA .	500 hours on 125 °C mounted on plate with dummy LED. Measurement points: initial, 62.5 hours, 500 and 1000 hours. Device not operated. Two contacts points should be measured, LED contact and PCB contact.



**NOTE**

Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.

Figure 1 end

3.18. Product Qualification and Requalification Test Sequence

TEST OR EXAMINATION	TEST GROUP (a)					
	1	2	3	4	5	6
	TEST SEQUENCE (b)					
Examination of product	1, 8	1, 7	1, 10	1, 9	1	1, 5
Drive efficiency (c)	2, 7	2, 4, 6	2, 9	2, 4, 6, 8	2, 4	2, 4
Forward Voltage to LED	3				3	
Output Current	4					
Dimming Curve Output Current	5					
65 V input (all lines)				5		
Output flicker	6					
ESD immunity			3			
Radiated immunity			4			
Fast transient/Burst immunity			5			
Injected currents			7			
Disturbance voltage limits			6			
Radiated disturbances			8			
Vibration		3				
Mechanical Shock		5				
Thermal cutout test				3		
Thermal shock				7		
Contact normal force relaxation						3



**NOTE**

- (a) Test group 1, 2, 4 & 6 shall contain 5 samples, dimmable and highest current version. Test group 3 will be done with 2 samples of the 1050 mA. Test group 5 shall consist of 2 samples of each version (on/off, dimmable for 350 mA, 500 mA, 700 mA and 1050 mA), any part number can be used for group & (contacts are for all versions the same).
- (b) Numbers indicate sequence in which tests are performed.
- (c) For group 4 a thermal couple should be soldered to the Tc of the driver (see 114-133082).

Figure 2



## 3.19. Resistor values

Output mode PCBA	Forward Voltage	Resistor value
350 mA	25 V dc	71 $\Omega$
	33 V dc	94 $\Omega$
	36 V dc	103 $\Omega$
	40 V dc	114 $\Omega$
500 mA	25 V dc	50 $\Omega$
	33 V dc	66 $\Omega$
	36 V dc	72 $\Omega$
	40 V dc	80 $\Omega$
700 mA	25 V dc	36 $\Omega$
	33 V dc	47 $\Omega$
	36 V dc	51 $\Omega$
	40 V dc	57 $\Omega$
1050 mA	25 V dc	24 $\Omega$
	33 V dc	31 $\Omega$
	36 V dc	34 $\Omega$
	40 V dc	38 $\Omega$

**Figure 3**