LUMAWISE Motion – Logic Output

SCOPE

1.1. The LUMAWISE Motion – Logic Output (PN 2445583) is an extension to the LUMAWISE Motion product line. The Logic Output version provides a high/low logic output to indicate motion status, as well as an analog voltage to indicate light level. The Logic Output version is powered by a DC voltage between 9V and 26.4V DC and is suitable for use in street and roadway lighting control, commercial and campus outdoor lighting management, and smart city and smart grid applications.

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 been completed. The Qualification Test Report number for this testing is 501-19333.

1.4. Inheritance from Standard Product

The LUMAWISE Motion – Logic Output re-uses many parts of the mechanical enclosure, including all latching, sealing, and lens fixation features, from the LUMAWISE Motion “Standard Product” (PN 2388426-1). Due to this design re-use of proven features, the following specifications are inherited from the 2388426-1 Product Specification (108-160457) and will not be re-tested for PN 2445583.

- Impact Testing per IEC 62262, IK07
- Ingress Testing per IEC 60529, IP6X + IPX6 + IPX8

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.

TE Documents

114-160647	Application Specification
108-160457	Standard Product 2388426-1 Product Specification
501-19333	Qualification report – LUMAWISE Motion – Logic Output

Industry Documents

IEC 61547	Equipment for general lighting purposes - EMC immunity requirements
EN 55015	Limits and Methods of Measurement of Radio Disturbance Characteristics of Electrical Lighting and Similar Equipment.
IEC 60512	Electromechanical Components for Electronic Equipment – Basic Testing Procedures and Measuring Methods.
IEC 60529	Degrees of protection provided by enclosures (IP Code).
IEC 61000-4	Electromagnetic Compatibility (EMC).
IEC 62262	Degrees of Protection Provided by Enclosures Against External Mechanical Impacts.
EIA 364	Electrical Connector/Socket Test Procedures Including Environmental Classifications.

Reference Document

109-160273	Test Specification - LUMAWISE Motion Logic Output

REQUIREMENTS

Design and Construction

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

Ratings

Input Voltage: 9 – 26.4 VDC

Current: Less than 25mA

Operating Temperature: -40 to +65°C

Storage Temperature: -40 to +65°C

Operating Humidity: 15 to 96% non-Condensing

Motion Output (High): Input Voltage – 1V

Motion Output (Low): Less than 1V

Light Output: 0.1 – 3.1V, Logarithmic output representation of light level (0-2000lx)

Test Procedure Summary

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

Test Description	Requirement	Procedure
Initial examination of product.	Meets requirements of product drawing and Application Specification.	EIA-364-18. Visual and dimensional (C of C) inspection per product drawing.
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual inspection.
ELECTRICAL		
Functionality Verification	Correct startup sequence and motion response on power-up.	Use automatic tester box as described in 109-160273, Section 3: “Functional Test”.
Environmental Performance	Conditions: -40 to 65°C Unit must pass ATB functional testing at all tested temperatures. If ATB test returns result “Waiting for no motion” timeout (code 1111111101 MO SUB NOK), wait 1 minute and re-test. Only one re-test is permitted.	DUT performance must be monitored across temperature range and across input voltage range. The following performance items must be verified: • Startup behavior, self-check and calibration • IR motion sensor activation Detailed test procedure described in 109-160273, Section 4: “Environmental Performance”
Powerline Transients	Unit to remain fully functional and responsive during tests. No device resets are permitted. Maximum Current ≤ 25 mA	Unit must be tested for overvoltage and supply dropout conditions. Detailed test procedure described in 109-160273 Section 5: “Powerline Transients”.

<table>
<tr><th>Test Description</th><th>Requirement</th><th>Procedure</th></tr>
<tr><td>Input Safety</td><td>Product fails in safe manor without smoke or fire external to the device.</td><td>305VAC shall be applied to the device input pins.

Four pieces shall be evaluated, with pins tied together as described in 109-160273 Section 6: “Input Safety”.

After testing, pieces should be marked with a red ‘X’ to indicate destructive test samples.</td></tr>
<tr><td>Fast Transient/Burst Immunity</td><td>Test level per IEC 61547

±0.5 kV
Tr/Th: 5/50 ns
Repetition rate: 5 kHz Repetition
Duration: ≥ 2min per polarity
Pass Criteria: B</td><td>IEC 61000-4-4

Detailed test procedure described in 109-160273 Section 7: “Fast Transient / Burst Immunity”</td></tr>
<tr><td>ESD immunity</td><td>Tests per IEC 61547

Air discharge level: 8 kV
Contact discharge level: 4 kV
Pass Criteria: B</td><td>IEC61000-4-2

10 discharges per location for each polarity

Refer to 109-160273 Section 8: “Additional Test Connections”</td></tr>
<tr><td>Conducted Emissions</td><td><table><tr><th colspan="2">Limits
dB (µV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>84 to 74</td><td>74 to 64</td></tr></table></td><td>CISRP 15 / EN 55015
Frequency range of 0.15-0.5 MHz

Measure at a distance of 10 m.

Powered by 12V DC bench supply

Refer to 109-160273 Section 8: “Additional Test Connections”</td></tr>
<tr><td>Radiated Emissions</td><td><table><tr><th>Frequency (MHz)</th><th>Quasi-peak limit dB(µV/m)</th></tr><tr><td>30 to 230</td><td>30</td></tr><tr><td>230 to 300</td><td>37</td></tr></table></td><td>CISRP 15 / EN 55015
Frequency range of 30-300 MHz

Measure at a distance of 10 m.

Powered by 12V DC bench supply

Refer to 109-160273 Section 8: “Additional Test Connections”</td></tr>
</table>

Test Description	Requirement	Procedure
Conducted Immunity	Tests per IEC 61547 Frequency range: 0.15-80 MHz Field strength: 3 V rms Modulation: 1 KHz Pass Criteria: B	IEC61000-4-6 The Frequency range shall be swept with a modulated signal. The rate of sweep does not exceed 1.5x 10-3 decade/s. The dwell time at each frequency shall be not less than the time necessary for the DUT to be able to respond. Test is applicable for all DC supply lines and for signal lines longer than 3m. Coupling method: coupling / decoupling network (CDN) preferred. Powered by 12V DC bench supply Refer to 109-160273 Section 8: “Additional Test Connections”
Radiated Immunity	Test level per IEC 61547 Field Strength: 3 V/m Freq. Range: 80-1000MHz Modulation: 1kHz, 80% AM, sine wave Pass Criteria: B	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 Front face only with vertical and horizontal polarization. Powered by 12V DC bench supply Refer to 109-160273 Section 8: “Additional Test Connections”
MECHANICAL		
Vibration	Correct startup sequence and motion response on power-up.	IEC 60512-6-4 Method 1. Subject mated specimens to 5 to 500 Hz random levels at 4.9g. 100 minutes in each of 3 mutually perpendicular planes.
Mechanical shock	Correct startup sequence and motion response on power-up.	IEC 60512-6-3. Subject mated specimens to 30 G's half-sine shock pulses of 11 milliseconds duration. Three shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks.

Test Description	Requirement	Procedure
ENVIRONMENTAL		
Thermal shock	See Note (a) Samples to be tested powered off and mated to receptacle.	EIA-364-32, Test Condition I. Subject unmated specimens to 250 cycles between -40 and 70°C with 30-minute dwells at temperature extremes and 1 minute transition between temperatures.
Damp Heat, Cyclic	See Note (a) Samples to be tested powered off and mated to receptacle.	IEC 60512-11-12. Subject mated specimens to 10 cycles (10 days) between 25 and 65°C at 90 to 100% RH.
Dry Heat	See Note (a) Samples to be tested powered off and mated to receptacle.	IEC 60512-11-9. Subject mated specimens to 70°C for 500 hours.

NOTE

a) 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

PRODUCT QUALIFICATION AND REQUALIFICATION TEST SEQUENCE

Test or Examination	Test Group					
	A	B	C	D	E	F
	Test Sequence					
Initial examination of product	1	1	1	1	1	1
Functionality Verification	2,5		2,5,10	2,5	2,5	2,5
Environmental Performance	3					
Powerline Transients	4					
Input Safety		2				
Conducted Emissions			3			
Radiated Emissions			4			
Fast Transient/Burst Immunity			6			
Conducted Immunity			7			
Radiated Immunity			8			
ESD			9			
Vibration				3		
Mechanical shock				4		
Thermal shock					3	
Humidity					4	3
Dry Heat						4
Final examination of product	6	3	11	6	6	6

Figure 2

QUALITY ASSURANCE PROVISIONS

Pre-Qualification Testing

Testing for a subset of these tests may be requested to verify product performance prior to final qualification or production process freeze. These tests may be used for engineering reference or as a reference for product performance but will not constitute final product Qualification.

Qualification Testing

Specimens randomly selected from full production process must pass all tests described in Figure 2 for product to be considered Qualified.

Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. Minimum specimen quantities are shown in Figure 3.

In total 24 pieces will be provided for testing. 21 pieces must be tested as shown below, with the remaining 3 pieces available as spares or for test group extension.

Specimen Description	Test Group Quantity (Minimum)						
	A	B	C	D	E	F	Total
2445583-1 Or 1-2445583-1	3	4	5	3	3	3	**21**

Figure 3

Requalification Testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality, and reliability engineering.

Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken, and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.