

**STANDARDS**
MALAYSIA

Certificate of Accreditation

No: SMM 577

Accredited since: 10 January 2013

This is to certify that

RELIABILITY ENGINEERING TEST & ANALYSIS
LABORATORY
OSRAM OPTO SEMICONDUCTOR (M) SDN. BHD.
BAYAN LEPAS, PULAU PINANG
MALAYSIA



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accreditation

has been granted accreditation in respect of the scope of accreditation described in the schedule, subject to the terms and conditions governing the *Skim Akreditasi Makmal Malaysia (SMM)*, the Laboratory Accreditation Scheme of Malaysia.

Laboratories accredited under SMM meet the requirements of MS ISO/IEC 17025. This Malaysian Standard is identical with ISO/IEC 17025 published by the International Organization for Standardization (ISO).



(DATUK FADILAH BAHARIN)
Director General
Department of Standards Malaysia

Date of issue: 7 September 2018

Schedule

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Valid until: 10 January 2022



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LABORATORY LOCATION:
(PERMANENT LABORATORY)



**RELIABILITY ENGINEERING TEST
RELIABILITY ENGINEERING & ANALYSIS
LABORATORY
OSRAM OPTO SEMICONDUCTOR (M) SDN. BHD.
PLOT 2, FREE INDUSTRIAL ZONE PHASE 4
BUILDING G4
11900 BAYAN LEPAS
PULAU PINANG
MALAYSIA**

FIELDS OF TESTING: ELECTRICAL & MECHANICAL

This laboratory has demonstrated its technical competence to operate in accordance with MS ISO/IEC 17025:2005 (ISO/IEC 17025:2005).

This laboratory's fulfillment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001 (see Joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF TESTING: ELECTRICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
LED, Detector	Electrical Characteristics: 1. Forward voltage characteristics: 200 mV to 200 V 2. Reverse current characteristic: 100 nA to 10 A Electrostatic Discharge (Human Body Model)	In-house method A66762-D0500-D044-*-7681, 2016-01-22, Rev6/ CIE 127; 2 nd Edition:2007 Clause 2.2 ANSI/ESDA/JEDEC JS-001--2017

Signatories:

1. **Law Choon Lin**
2. **Benny Chew Wei Lun**
3. **Teoh Sua Lim**

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SCOPE OF TESTING: ELECTRICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
LED	Optical Characteristics 1. Wavelength: 200 nm to 800 nm 2. Luminous intensity (Iv) 0.1 mcd to 2000 cd 3. Color coordinate X, Y 0.2 to 0.5	CIE 127 (2 nd edition: 2007)

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3. **Teoh Sua Lim**

SCOPE OF TESTING: MECHANICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
LED, Detector	Resistance to soldering heat (Reflow) Resistance to soldering heat (TTW) Resistance to soldering heat (Dip) Solderability	JESD22-A113H, (Nov 2016)/ IEC 60068-2-20 Clause 5 (Edition 2.0 2006-04) JESD22-B106E (Nov 2016)/ IEC 60068-2-20 Clause 5 (Edition 5.0 2008-07) JESD-B106E (Nov 2016)/ IEC 60068-2-20 Clause 5 (Edition 5.0 2008-07) JESD22-B102E (Oct 2007)/ IEC 60068-2-20 Clause 4 (edition 5.0 2008-07)

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SCOPE OF TESTING: MECHANICAL (ENVIRONMENTAL)

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
LED, Detector	Temperature and Humidity Bias	JESD-A101D (July 2015)/ IEC 60068-2-67 (Edition 1.0 1995-12)
	Temperature and Humidity Reverse Bias	JESD-A101D (July 2015)/ IEC 60068-2-78 (2.0 2012-10)
	Temperature and Humidity Storage	JESD22-A101D (July 2015)
	High Temperature Storage	JESD22-A103E Condition A & B (October 2015)/ IEC 60068-2-2 (Edition 6.0 2009-01)
	Temperature Cycling (Air)	JESD22-A104E Condition G N & T (October 2014)
	Power Temperature Cycle	JESD22-A105C; Method A & B (January 2004)
	Thermal Shock (Liquid)	JESD22-106B (November 2016)/ IEC 60068-2-14; Test N (Edition 6.0 2009-01)
	High Temperature Reverse Bias	JESD22-A108F (July 2017)
	Steady State Life Test	JESD22-A108F (July 2017)
	Pulse Life Test	JESD22-A108F (Jul 2017)
	Low Temperature Storage	JESD22-A119; Condition A (Oct 2015)/ IEC 60068-2-1 (Edition 6.0 2007-03)
Highly-Accelerated Temperature and Humidity Stress Test (HAST)	JESD22-A110E; (July 2015)	

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SCOPE OF TESTING: MECHANICAL (ENVIRONMENTAL)

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
LED, Detector (continue)	Accelerated Moisture Resistance-Unbiased Autoclave (Pressure Cooker Test (PCT))	JESD22-A102E; (July 2015)
	Damp Heat Cyclic (DHC)	IEC 60068-2-30 (Edition 3.0_2005-08)
	Composite Temperature/Humidity Cyclic Test (CTHC)	IEC 60068-2-38 (First Edition_1974)
	Dewing Test	Customer Specific Method based on GS 95011-4 (2009-10)

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LABORATORY LOCATION:
(PERMANENT LABORATORY)

**ANALYSIS LABORATORY
RELIABILITY ENGINEERING TEST & ANALYSIS
LABORATORY
OSRAM OPTO SEMICONDUCTOR (M) SDN. BHD.
BUILDING PEN 1
BAYAN LEPAS FREE INDUSTRIAL ZONE PHASE 1
11900 BAYAN LEPAS
PULAU PINANG
MALAYSIA**

SCOPE OF TESTING: ELECTRICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
LED, Detector	Electrical Characteristics: 1. Forward voltage characteristics: 200 mV to 200 V 2. Reverse current characteristic: 100 nA to 10 A	In-house method A66762-D0500-D044*-7681, 2016-01-22, Rev6/ CIE 127; 2 nd Edition:2007 Clause 2.2

Signatories:

1. **Law Choon Lin**
2. **Benny Chew Wei Lun**
3. **Kenny Loh Kheng Poh**

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SCOPE OF TESTING: MECHANICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
LED, Detector	Scanning Electron Microscope (SEM) – imaging and measurement/ evaluation	In-house method A66762-D0500-D193-xx-7681; 20165-04-16, Rev02 In-house method A66762-D0500-D166-*-7681; 2016-04-17, Rev04
	Energy Dispersive X-Ray Analysis (EDX) – qualitative elemental analysis: BE to U	In-house method A66762-D0500-D122-*-7681; 2016-04-23, Rev03
	X-Ray Transmission Analysis (X-ray) – imaging & evaluation	A66762-D0500-D093-xx-7681; 2016-04-17, Rev06
	Cross sectioning – sample preparation & evaluation	In-house method A66762-D0500-*-7681; 2016-09-06, Rev06
	Decapsulation – sample preparation & evaluation	In-house method A66762-D0500-D049-*-7681; 2016-01-24, Rev07 In-house method A66762-D0500-D052-*-7681; 2014-06-25, Rev03
	Focused Ion Beam (FIB) – imaging and evaluation	In-house method A66762-D0500-D159-*-7681; 2016-04-16, Rev04
	Photon emission Microscope (PEM)- imaging and evaluation	In-house method A66762-D0500-D160-*-7681; 2016-01-26, Rev05

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Signatories:

1. **Kenny Loh Kheng Poh**
2. **Chan Pooi Quan**