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# INTERNATIONAL STANDARD



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**Semiconductor devices –  
Part 5-6: Optoelectronic devices – Light emitting diodes**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## CONTENTS

FOREWORD .....	8
1 Scope .....	10
2 Normative references .....	10
3 Terms, definitions and abbreviations .....	11
3.1 General terms and definitions .....	11
3.2 Terms and definitions relating to the measurement of the quantity of radiation .....	14
3.3 Terms and definitions relating to the measurement of the photometric quantity .....	18
3.4 Terms and definitions relating to the measurement of the thermal quantity .....	23
3.5 Abbreviations .....	24
4 Absolute maximum ratings .....	11
5 Electrical and optical characteristics .....	26
6 Measuring method .....	27
6.1 Basic requirements .....	27
6.1.1 Measuring conditions .....	27
6.1.2 Measuring instruments and equipment .....	28
6.1.3 Essential requirements .....	29
6.1.4 General precautions .....	30
6.2 Forward voltage ( $V_F$ ) measurement .....	30
6.2.1 Purpose .....	30
6.2.2 Circuit diagram .....	30
6.2.3 Requirements .....	30
6.2.4 Measurement procedure .....	32
6.2.5 Precautions to be observed .....	32
6.2.6 Specified conditions .....	32
6.3 Reverse voltage ( $V_R$ ) measurement .....	32
6.3.1 Purpose .....	32
6.3.2 Circuit diagram .....	32
6.3.3 Measurement procedure .....	32
6.3.4 Precautions to be observed .....	33
6.3.5 Specified conditions .....	33
6.4 Differential resistance ( $r_f$ ) measurement .....	33
6.4.1 Purpose .....	33
6.4.2 Circuit diagram .....	33
6.4.3 Requirements .....	33
6.4.4 Measurement procedure .....	33
6.4.5 Precautions to be observed .....	34
6.4.6 Specified conditions .....	34
6.5 Reverse current ( $I_R$ ) measurement .....	34
6.5.1 Purpose .....	34
6.5.2 Circuit diagram .....	34
6.5.3 Provisions .....	35
6.5.4 Measurement procedure .....	35
6.5.5 Precautions to be observed .....	35

6.5.6	Specified conditions.....	35
6.6	Measurement of capacitance between terminals ( $C_t$ ).....	35
6.6.1	General .....	35
6.6.2	Measurement using LCR meter.....	36
6.6.3	Measurement using AC bridge.....	36
6.7	Measurement of junction temperature ( $T_j$ ) and thermal resistance ( $R_{th(j-X)el}$ , $R_{th(j-X)real}$ ).....	38
6.7.1	Purpose.....	38
6.7.2	Measurement principle.....	38
6.7.3	Measurement procedure .....	38
6.7.4	Precautions to be observed .....	47
6.7.5	Specified conditions.....	49
6.8	Response time measurement.....	49
6.8.1	Purpose.....	49
6.8.2	Circuit diagram .....	49
6.8.3	Provisions.....	50
6.8.4	Measurement procedure .....	50
6.8.5	Precautions to be observed .....	51
6.8.6	Specified conditions.....	51
6.9	Frequency response and cut-off frequency ( $f_c$ ) measurement .....	52
6.9.1	Purpose.....	52
6.9.2	Circuit diagram .....	52
6.9.3	Provisions.....	53
6.9.4	Measurement procedure .....	53
6.9.5	Precautions to be observed .....	54
6.9.6	Specified conditions.....	54
6.10	Luminous flux ( $\Phi_V$ ) measurement.....	54
6.10.1	Purpose.....	54
6.10.2	Measurement principle.....	54
6.10.3	Measuring circuit .....	54
6.10.4	Measurement procedure .....	55
6.10.5	Precautions to be observed .....	55
6.10.6	Measurement conditions to be defined.....	56
6.11	Radiant <del>power</del> flux ( $\Phi_e$ ) measurement .....	56
6.11.1	Purpose.....	56
6.11.2	Measurement principle.....	56
6.11.3	Measuring circuit .....	57
6.11.4	Measurement procedure .....	57
6.11.5	Precautions to be observed .....	57
6.11.6	Measurement conditions to be defined.....	58
6.12	Luminous intensity ( $I_V$ ) measurement .....	58
6.12.1	Purpose.....	58
6.12.2	Measurement principle.....	58
6.12.3	Measuring circuit .....	59
6.12.4	Measurement procedure .....	60
6.12.5	Precautions to be observed .....	60
6.12.6	Measurement conditions to be defined.....	60
6.13	Radiant intensity ( $I_e$ ) measurement .....	60

6.13.1	Purpose	60
6.13.2	Measurement principle	60
6.13.3	Measuring circuit	61
6.13.4	Measurement procedure	61
6.13.5	Measurement conditions to be defined	61
6.14	Luminance ( $L_V$ ) measurement	61
6.14.1	Purpose	61
6.14.2	Measuring circuit	62
6.14.3	Measurement procedure	62
6.14.4	Measurement conditions to be defined	62
6.15	Emission spectrum distribution, peak emission wavelength ( $\lambda_p$ ), and spectral half bandwidth ( $\Delta\lambda$ ) measurement	63
6.15.1	Purpose	63
6.15.2	Measuring circuit	63
6.15.3	Measurement procedure	64
6.15.4	Measurement conditions to be defined	65
6.16	Chromaticity measurement	65
6.16.1	Purpose	65
6.16.2	Measurement principle	66
6.16.3	Measuring circuit	68
6.16.4	Measurement procedure	68
6.16.5	Measuring conditions to be defined	68
6.17	Directional characteristics and full width half maximum of an intensity measurement	69
6.17.1	Purpose	69
6.17.2	Measuring circuit	69
6.17.3	Measurement procedure	69
6.17.4	Measuring conditions to be defined	70
6.18	Illuminance ( $E_V$ ) measurement	71
6.18.1	Purpose	71
6.18.2	Measuring circuit	71
6.18.3	Measurement procedure	71
6.18.4	Measuring conditions to be defined	71
7	Items to be indicated on the package	71
8	Quality evaluation	72
8.1	General	72
8.2	Classification of quality evaluations	72
8.2.1	General	72
8.2.2	Classification I	72
8.2.3	Classification II	72
8.2.4	Classification III	72
8.2.5	Precautions to be observed	72
8.3	Quality evaluation test	79
8.3.1	General	79
8.3.2	Specimens	79
8.4	Lot quality inspection	80
8.4.1	General	80
8.4.2	Specimens	80

8.5	Periodical quality inspection.....	80
8.5.1	General .....	80
8.5.2	Specimens.....	80
8.5.3	Inspection period .....	80
8.6	Easing of the lot quality inspection standards.....	80
8.7	Periodical evaluation maintenance tests .....	81
8.7.1	Test items and specimens .....	81
8.7.2	Test period .....	81
8.8	Long-term storage products .....	81
8.9	Continuous current test.....	81
8.9.1	General .....	81
8.9.2	Initial measurement .....	81
8.9.3	Test circuits.....	81
8.9.4	Test conditions .....	82
8.9.5	Post-treatment.....	82
8.9.6	Final measurement .....	82
Annex A (normative)	Standard luminous efficiency.....	83
Annex B (normative)	How to obtain the self-absorption correction factor .....	86
B.1	Purpose .....	86
B.2	LED light sources for self-absorption measurement .....	86
B.3	Method .....	86
Annex C (normative)	How to obtain the colour correction factor .....	88
C.1	Purpose .....	88
C.2	Method .....	88
C.2.1	Luminous flux and luminous intensity measurement.....	88
C.2.2	Radiant flux and radiant intensity measurement.....	89
Annex D (normative)	Calibration of the luminance meter.....	90
D.1	Purpose .....	90
D.2	How to perform the calibration .....	90
Annex E (normative)	Colour-matching function of the XYZ colour system .....	92
Annex F (normative)	Spectral chromaticity coordinates .....	98
Annex G (normative)	<del>lluminometer</del> Illuminance meter calibration .....	103
G.1	Purpose .....	103
G.2	How to perform the calibration .....	103
Bibliography.....		104
Figure 1 – Radiant intensity .....		16
Figure 2 – Radiance.....		17
Figure 3 – Radiant exitance .....		18
Figure 4 – Irradiance.....		18
Figure 5 – Spectral luminous efficiency.....		19
Figure 6 – Circuit diagram for $V_F$ measurement .....		30
Figure 7 – Circuit diagram for $V_F$ measurement with a constant voltage source and a current-limiting resistor .....		31
Figure 8 – Circuit diagram for $V_F$ measurement using an SMU.....		31
Figure 9 – Circuit diagram for $V_R$ measurement.....		32

Figure 10 – Circuit diagram for $r_f$ measurement .....	33
Figure 11 – Circuit diagram for $I_R$ measurement .....	35
Figure 12 – Circuit diagram for $C_t$ measurement .....	36
Figure 13 – Circuit diagram for $C_t$ measurement .....	37
Figure 14 – An example of the temperature dependence of $\eta_{PE}$ .....	39
<del>Figure 15 – Waveform of change in <math>V_F</math> .....</del>	<del>39</del>
Figure 15 – Heating time duration dependence of the measured thermal resistance .....	40
<del>Figure 16 – Transient change in thermal resistance (double logarithmic plots) .....</del>	<del>40</del>
Figure 16 – Cumulative thermal capacitance versus cumulative thermal resistance characteristics (structural function) .....	40
Figure 17 – Circuit diagram for measurement of change in $V_F$ .....	42
Figure 18 – Change in $V_F$ during the measurement .....	43
Figure 19 – Example of the time variation in $V_F$ .....	44
Figure 20 – Transient vibration waveform immediately after the heating is off .....	44
Figure 21 – Circuit diagram for response time measurement .....	50
Figure 22 – Waveform of response time measurement .....	52
Figure 23 – Circuit diagram for $f_c$ measurement .....	53
Figure 24 – Circuit diagram for $\Phi_V$ measurement .....	55
Figure 25 – Circuit diagram for $\Phi_e$ measurement .....	57
Figure 26 – Schematic diagram for $I_V$ measurement .....	59
Figure 27 – Circuit diagram for $I_V$ measurement .....	59
Figure 28 – Circuit diagram for $I_e$ measurement .....	61
Figure 29 – Circuit diagram for $L_V$ measurement .....	62
Figure 30 – Circuit diagram for $\lambda_p$ measurement .....	63
Figure 31 – Circuit diagram for $\lambda_p$ measurement .....	64
Figure 32 – Schematic diagram of $\Delta\lambda$ measurement .....	65
Figure 33 – Chromaticity .....	67
Figure 34 – Circuit diagram for chromaticity measurement .....	69
Figure 35 – Directional characteristics (example 1) .....	70
Figure 36 – Directional characteristics (example 2) .....	70
Figure 37 – Circuit diagram for $E_V$ measurement .....	71
Figure 38 – Circuit diagram for continuous current test .....	82
Figure B.1 – Schematic diagram for self-absorption measurement .....	86
Figure D.1 – Schematic diagrams for calibration .....	91
Figure G.1 – Schematic diagram for calibration .....	103
Table 1 – Absolute maximum ratings .....	25
Table 2 – Electrical and optical characteristics .....	26
Table 3 – CIE averaged LED intensity measurements .....	59
Table 4 – Items for the screening test and their conditions(reference) .....	73

Table 5 – Quality evaluation tests .....	74
Table 6 – Lot quality inspection.....	76
Table 7 – Periodical quality inspection .....	79
Table A.1 – Definitive values of the spectral luminous efficiency function for photopic vision $V(\lambda)$ .....	83
Table E.1 – Colour-matching function of the $XYZ$ colour system .....	92
Table F.1 – Spectral chromaticity coordinates.....	98

# INTERNATIONAL ELECTROTECHNICAL COMMISSION

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## SEMICONDUCTOR DEVICES –

### Part 5-6: Optoelectronic devices – Light emitting diodes

#### FOREWORD

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IEC 60747-5-6 has been prepared by subcommittee 47E: Discrete semiconductor devices, of IEC technical committee 47: Semiconductor devices. It is an International Standard.

This second edition cancels and replaces the first edition published in 2016. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) ultraviolet-emitting diodes (UV LED) and their related technical contents were added;
- b) power efficiency ( $\eta_{PE}$ ) as part of electrical and optical characteristics were added;
- c) new measuring methods related to thermal resistance were added;
- d) hydrogen sulphide corrosion test was added to quality evaluation;
- e) some standards were added to the bibliography.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
47E/745/FDIS	47E/752/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

A list of all parts in the IEC 60747 series, published under the general title *Semiconductor devices*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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## SEMICONDUCTOR DEVICES –

### Part 5-6: Optoelectronic devices – Light emitting diodes

#### 1 Scope

This part of IEC 60747 specifies the terminology, the essential ratings and characteristics, the measuring methods and the quality evaluations of light emitting diodes (LEDs) for general industrial applications such as signals, controllers, sensors, etc.

LEDs for lighting applications are out of the scope of this part of IEC 60747.

LEDs are classified as follows:

- a) LED package;
- b) LED flat illuminator;
- c) LED numeric display and alpha-numeric display;
- d) LED dot-matrix display;
- e) ~~HLED~~ (infrared-emitting diode (IR LED));
- f) ultraviolet-emitting diode (UV LED).

LEDs with a heat spreader or having a terminal geometry that performs the function of a heat spreader are within the scope of this part of IEC 60747.

An integration of LEDs and controlgears, integrated LED modules, semi-integrated LED modules, integrated LED lamps or semi-integrated LED lamps, are out of the scope of this part of IEC 60747.

#### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60051 (all parts), *Direct acting indicating analogue electrical measuring instruments and their accessories*

IEC 60068-2-17, *Basic environmental testing procedures – Part 2-17: Tests – Test Q: Sealing*

IEC 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60747-5-13, *Semiconductor devices – Part 5-13: Optoelectronic devices – Hydrogen sulphide corrosion test for LED packages*

IEC 60749-6, *Semiconductor devices – Mechanical and climatic test methods – Part 6: Storage at high temperature*

IEC 60749-10, *Semiconductor devices – Mechanical and climatic test methods – Part 10: Mechanical shock*

IEC 60749-12, *Semiconductor devices – Mechanical and climatic test methods – Part 12: Vibration, variable frequency*

IEC 60749-14, *Semiconductor devices – Mechanical and climatic test methods – Part 14: Robustness of terminations (lead integrity)*

IEC 60749-15, *Semiconductor devices – Mechanical and climatic test methods – Part 15: Resistance to soldering temperature for through-hole mounted devices*

IEC 60749-20, *Semiconductor devices – Mechanical and climatic test methods – Part 20: Resistance of plastic encapsulated SMDs to the combined effect of moisture and soldering heat*

IEC 60749-21, *Semiconductor devices – Mechanical and climatic test methods – Part 21: Solderability*

IEC 60749-24, *Semiconductor devices – Mechanical and climatic test methods – Part 24: Accelerated moisture resistance – Unbiased HAST*

IEC 60749-25, *Semiconductor devices – Mechanical and climatic test methods – Part 25: Temperature cycling*

IEC 60749-36, *Semiconductor devices – Mechanical and climatic test methods – Part 36: Acceleration, steady state*

ISO 2859-1, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

# INTERNATIONAL STANDARD

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**Semiconductor devices –  
Part 5-6: Optoelectronic devices – Light emitting diodes**



## CONTENTS

FOREWORD .....	8
1 Scope .....	10
2 Normative references .....	10
3 Terms, definitions and abbreviations .....	11
3.1 General terms and definitions .....	11
3.2 Terms and definitions relating to the measurement of the quantity of radiation .....	14
3.3 Terms and definitions relating to the measurement of the photometric quantity .....	17
3.4 Terms and definitions relating to the measurement of the thermal quantity .....	21
3.5 Abbreviations .....	22
4 Absolute maximum ratings .....	22
5 Electrical and optical characteristics .....	23
6 Measuring method .....	24
6.1 Basic requirements .....	24
6.1.1 Measuring conditions .....	24
6.1.2 Measuring instruments and equipment .....	25
6.1.3 Essential requirements .....	26
6.1.4 General precautions .....	27
6.2 Forward voltage ( $V_F$ ) measurement .....	27
6.2.1 Purpose .....	27
6.2.2 Circuit diagram .....	27
6.2.3 Requirements .....	27
6.2.4 Measurement procedure .....	29
6.2.5 Precautions to be observed .....	29
6.2.6 Specified conditions .....	29
6.3 Reverse voltage ( $V_R$ ) measurement .....	29
6.3.1 Purpose .....	29
6.3.2 Circuit diagram .....	29
6.3.3 Measurement procedure .....	29
6.3.4 Precautions to be observed .....	30
6.3.5 Specified conditions .....	30
6.4 Differential resistance ( $r_f$ ) measurement .....	30
6.4.1 Purpose .....	30
6.4.2 Circuit diagram .....	30
6.4.3 Requirements .....	30
6.4.4 Measurement procedure .....	30
6.4.5 Precautions to be observed .....	31
6.4.6 Specified conditions .....	31
6.5 Reverse current ( $I_R$ ) measurement .....	31
6.5.1 Purpose .....	31
6.5.2 Circuit diagram .....	31
6.5.3 Provisions .....	32
6.5.4 Measurement procedure .....	32
6.5.5 Precautions to be observed .....	32

6.5.6	Specified conditions.....	32
6.6	Measurement of capacitance between terminals ( $C_t$ ).....	32
6.6.1	General .....	32
6.6.2	Measurement using LCR meter.....	33
6.6.3	Measurement using AC bridge.....	33
6.7	Measurement of junction temperature ( $T_j$ ) and thermal resistance ( $R_{th(j-X)el}$ , $R_{th(j-X)real}$ ) .....	35
6.7.1	Purpose.....	35
6.7.2	Measurement principle.....	35
6.7.3	Measurement procedure .....	37
6.7.4	Precautions to be observed .....	42
6.7.5	Specified conditions.....	42
6.8	Response time measurement.....	42
6.8.1	Purpose.....	42
6.8.2	Circuit diagram .....	42
6.8.3	Provisions.....	43
6.8.4	Measurement procedure .....	43
6.8.5	Precautions to be observed .....	43
6.8.6	Specified conditions.....	44
6.9	Frequency response and cut-off frequency ( $f_c$ ) measurement .....	44
6.9.1	Purpose.....	44
6.9.2	Circuit diagram .....	44
6.9.3	Provisions.....	45
6.9.4	Measurement procedure .....	45
6.9.5	Precautions to be observed .....	46
6.9.6	Specified conditions.....	46
6.10	Luminous flux ( $\Phi_v$ ) measurement.....	46
6.10.1	Purpose.....	46
6.10.2	Measurement principle.....	46
6.10.3	Measuring circuit .....	46
6.10.4	Measurement procedure .....	47
6.10.5	Precautions to be observed .....	47
6.10.6	Measurement conditions to be defined.....	48
6.11	Radiant flux ( $\Phi_e$ ) measurement.....	48
6.11.1	Purpose.....	48
6.11.2	Measurement principle.....	48
6.11.3	Measuring circuit .....	49
6.11.4	Measurement procedure .....	49
6.11.5	Precautions to be observed .....	49
6.11.6	Measurement conditions to be defined.....	50
6.12	Luminous intensity ( $I_v$ ) measurement .....	50
6.12.1	Purpose.....	50
6.12.2	Measurement principle.....	50
6.12.3	Measuring circuit .....	51
6.12.4	Measurement procedure .....	52
6.12.5	Precautions to be observed .....	52
6.12.6	Measurement conditions to be defined.....	52
6.13	Radiant intensity ( $I_e$ ) measurement .....	52

6.13.1	Purpose .....	52
6.13.2	Measurement principle.....	52
6.13.3	Measuring circuit .....	53
6.13.4	Measurement procedure .....	53
6.13.5	Measurement conditions to be defined.....	53
6.14	Luminance ( $L_V$ ) measurement .....	53
6.14.1	Purpose .....	53
6.14.2	Measuring circuit .....	54
6.14.3	Measurement procedure .....	54
6.14.4	Measurement conditions to be defined.....	54
6.15	Emission spectrum distribution, peak emission wavelength ( $\lambda_p$ ), and spectral half bandwidth ( $\Delta\lambda$ ) measurement .....	55
6.15.1	Purpose .....	55
6.15.2	Measuring circuit .....	55
6.15.3	Measurement procedure .....	56
6.15.4	Measurement conditions to be defined.....	57
6.16	Chromaticity measurement.....	57
6.16.1	Purpose .....	57
6.16.2	Measurement principle.....	57
6.16.3	Measuring circuit .....	60
6.16.4	Measurement procedure .....	60
6.16.5	Measuring conditions to be defined.....	60
6.17	Directional characteristics and full width half maximum of an intensity measurement .....	60
6.17.1	Purpose .....	60
6.17.2	Measuring circuit .....	61
6.17.3	Measurement procedure .....	61
6.17.4	Measuring conditions to be defined.....	62
6.18	Illuminance ( $E_V$ ) measurement.....	63
6.18.1	Purpose .....	63
6.18.2	Measuring circuit .....	63
6.18.3	Measurement procedure .....	63
6.18.4	Measuring conditions to be defined.....	63
7	Items to be indicated on the package.....	63
8	Quality evaluation .....	64
8.1	General.....	64
8.2	Classification of quality evaluations .....	64
8.2.1	General .....	64
8.2.2	Classification I.....	64
8.2.3	Classification II .....	64
8.2.4	Classification III .....	64
8.2.5	Precautions to be observed .....	64
8.3	Quality evaluation test .....	70
8.3.1	General .....	70
8.3.2	Specimens.....	71
8.4	Lot quality inspection .....	71
8.4.1	General .....	71
8.4.2	Specimens.....	71

8.5	Periodical quality inspection.....	71
8.5.1	General .....	71
8.5.2	Specimens.....	71
8.5.3	Inspection period .....	71
8.6	Easing of the lot quality inspection standards.....	71
8.7	Periodical evaluation maintenance tests .....	72
8.7.1	Test items and specimens .....	72
8.7.2	Test period .....	72
8.8	Long-term storage products .....	72
8.9	Continuous current test.....	72
8.9.1	General .....	72
8.9.2	Initial measurement .....	72
8.9.3	Test circuits.....	72
8.9.4	Test conditions .....	73
8.9.5	Post-treatment.....	73
8.9.6	Final measurement .....	73
Annex A (normative)	Standard luminous efficiency.....	74
Annex B (normative)	How to obtain the self-absorption correction factor .....	77
B.1	Purpose .....	77
B.2	LED light sources for self-absorption measurement .....	77
B.3	Method .....	77
Annex C (normative)	How to obtain the colour correction factor .....	79
C.1	Purpose .....	79
C.2	Method .....	79
C.2.1	Luminous flux and luminous intensity measurement.....	79
C.2.2	Radiant flux and radiant intensity measurement.....	80
Annex D (normative)	Calibration of the luminance meter.....	81
D.1	Purpose .....	81
D.2	How to perform the calibration .....	81
Annex E (normative)	Colour-matching function of the <i>XYZ</i> colour system .....	83
Annex F (normative)	Spectral chromaticity coordinates .....	88
Annex G (normative)	Illuminance meter calibration .....	93
G.1	Purpose .....	93
G.2	How to perform the calibration .....	93
Bibliography.....		94
Figure 1 – Radiant intensity .....		15
Figure 2 – Radiance.....		16
Figure 3 – Radiant exitance .....		16
Figure 4 – Irradiance.....		17
Figure 5 – Spectral luminous efficiency.....		18
Figure 6 – Circuit diagram for $V_F$ measurement .....		27
Figure 7 – Circuit diagram for $V_F$ measurement with a constant voltage source and a current-limiting resistor .....		28
Figure 8 – Circuit diagram for $V_F$ measurement using an SMU.....		28
Figure 9 – Circuit diagram for $V_R$ measurement.....		29



Figure 10 – Circuit diagram for $r_f$ measurement .....	30
Figure 11 – Circuit diagram for $I_R$ measurement .....	32
Figure 12 – Circuit diagram for $C_t$ measurement .....	33
Figure 13 – Circuit diagram for $C_t$ measurement .....	34
Figure 14 – An example of the temperature dependence of $\eta_{PE}$ .....	35
Figure 15 – Heating time duration dependence of the measured thermal resistance .....	36
Figure 16 – Cumulative thermal capacitance versus cumulative thermal resistance characteristics (structural function) .....	37
Figure 17 – Circuit diagram for measurement of change in $V_F$ .....	38
Figure 18 – Change in $V_F$ during the measurement.....	39
Figure 19 – Example of the time variation in $V_F$ .....	40
Figure 20 – Transient vibration waveform immediately after the heating is off .....	40
Figure 21 – Circuit diagram for response time measurement.....	42
Figure 22 – Waveform of response time measurement.....	44
Figure 23 – Circuit diagram for $f_c$ measurement.....	45
Figure 24 – Circuit diagram for $\Phi_V$ measurement.....	47
Figure 25 – Circuit diagram for $\Phi_e$ measurement .....	49
Figure 26 – Schematic diagram for $I_V$ measurement.....	51
Figure 27 – Circuit diagram for $I_V$ measurement .....	51
Figure 28 – Circuit diagram for $I_e$ measurement .....	53
Figure 29 – Circuit diagram for $L_V$ measurement.....	54
Figure 30 – Circuit diagram for $\lambda_p$ measurement.....	55
Figure 31 – Circuit diagram for $\lambda_p$ measurement.....	56
Figure 32 – Schematic diagram of $\Delta\lambda$ measurement.....	57
Figure 33 – Chromaticity .....	59
Figure 34 – Circuit diagram for chromaticity measurement.....	61
Figure 35 – Directional characteristics (example 1).....	62
Figure 36 – Directional characteristics (example 2).....	62
Figure 37 – Circuit diagram for $E_V$ measurement.....	63
Figure 38 – Circuit diagram for continuous current test .....	73
Figure B.1 – Schematic diagram for self-absorption measurement .....	77
Figure D.1 – Schematic diagrams for calibration .....	82
Figure G.1 – Schematic diagram for calibration.....	93
Table 1 – Absolute maximum ratings .....	22
Table 2 – Electrical and optical characteristics.....	23
Table 3 – CIE averaged LED intensity measurements.....	51
Table 4 – Items for the screening test and their conditions(reference).....	64
Table 5 – Quality evaluation tests .....	65
Table 6 – Lot quality inspection.....	67

Table 7 – Periodical quality inspection ..... 70

Table A.1 – Definitive values of the spectral luminous efficiency function for photopic vision  $V(\lambda)$  ..... 74

Table E.1 – Colour-matching function of the  $XYZ$  colour system ..... 83

Table F.1 – Spectral chromaticity coordinates ..... 88

# INTERNATIONAL ELECTROTECHNICAL COMMISSION

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## SEMICONDUCTOR DEVICES –

### Part 5-6: Optoelectronic devices – Light emitting diodes

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IEC 60747-5-6 has been prepared by subcommittee 47E: Discrete semiconductor devices, of IEC technical committee 47: Semiconductor devices. It is an International Standard.

This second edition cancels and replaces the first edition published in 2016. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) ultraviolet-emitting diodes (UV LED) and their related technical contents were added;
- b) power efficiency ( $\eta_{PE}$ ) as part of electrical and optical characteristics were added;
- c) new measuring methods related to thermal resistance were added;
- d) hydrogen sulphide corrosion test was added to quality evaluation;
- e) some standards were added to the bibliography.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
47E/745/FDIS	47E/752/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

A list of all parts in the IEC 60747 series, published under the general title *Semiconductor devices*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

## SEMICONDUCTOR DEVICES –

### Part 5-6: Optoelectronic devices – Light emitting diodes

#### 1 Scope

This part of IEC 60747 specifies the terminology, the essential ratings and characteristics, the measuring methods and the quality evaluations of light emitting diodes (LEDs) for general industrial applications such as signals, controllers, sensors, etc.

LEDs for lighting applications are out of the scope of this part of IEC 60747.

LEDs are classified as follows:

- a) LED package;
- b) LED flat illuminator;
- c) LED numeric display and alpha-numeric display;
- d) LED dot-matrix display;
- e) infrared-emitting diode (IR LED);
- f) ultraviolet-emitting diode (UV LED).

LEDs with a heat spreader or having a terminal geometry that performs the function of a heat spreader are within the scope of this part of IEC 60747.

An integration of LEDs and controlgears, integrated LED modules, semi-integrated LED modules, integrated LED lamps or semi-integrated LED lamps, are out of the scope of this part of IEC 60747.

#### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60051 (all parts), *Direct acting indicating analogue electrical measuring instruments and their accessories*

IEC 60068-2-17, *Basic environmental testing procedures – Part 2-17: Tests – Test Q: Sealing*

IEC 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60747-5-13, *Semiconductor devices – Part 5-13: Optoelectronic devices – Hydrogen sulphide corrosion test for LED packages*

IEC 60749-6, *Semiconductor devices – Mechanical and climatic test methods – Part 6: Storage at high temperature*

IEC 60749-10, *Semiconductor devices – Mechanical and climatic test methods – Part 10: Mechanical shock*

IEC 60749-12, *Semiconductor devices – Mechanical and climatic test methods – Part 12: Vibration, variable frequency*

IEC 60749-14, *Semiconductor devices – Mechanical and climatic test methods – Part 14: Robustness of terminations (lead integrity)*

IEC 60749-15, *Semiconductor devices – Mechanical and climatic test methods – Part 15: Resistance to soldering temperature for through-hole mounted devices*

IEC 60749-20, *Semiconductor devices – Mechanical and climatic test methods – Part 20: Resistance of plastic encapsulated SMDs to the combined effect of moisture and soldering heat*

IEC 60749-21, *Semiconductor devices – Mechanical and climatic test methods – Part 21: Solderability*

IEC 60749-24, *Semiconductor devices – Mechanical and climatic test methods – Part 24: Accelerated moisture resistance – Unbiased HAST*

IEC 60749-25, *Semiconductor devices – Mechanical and climatic test methods – Part 25: Temperature cycling*

IEC 60749-36, *Semiconductor devices – Mechanical and climatic test methods – Part 36: Acceleration, steady state*

ISO 2859-1, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*