

Mesh Device Properties

Bluetooth® Specification

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Abstract:

This specification documents the device properties required for the Mesh Model specification.



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1 Introduction

This specification contains the normative definitions for all adopted GATT characteristics and characteristic descriptors, with the exception of those defined in the Bluetooth Core Specification or in Bluetooth Service specifications.

1.1 Language

1.1.1 Language conventions

The Bluetooth SIG has established the following conventions for use of the words **shall**, **must**, **will**, **should**, **may**, **can**, **is**, and **note** in the development of specifications:

shall	<u>is required to</u> – used to define requirements.
must	<u>is a natural consequence of</u> – used only to describe unavoidable situations.
will	<u>it is true that</u> – only used in statements of fact.
should	<u>is recommended that</u> – used to indicate that among several possibilities one is recommended as particularly suitable, but not required.
may	<u>is permitted to</u> – used to allow options.
can	<u>is able to</u> – used to relate statements in a causal manner.
is	<u>is defined as</u> – used to further explain elements that are previously required or allowed.
note	Used to indicate text that is included for informational purposes only and is not required in order to implement the specification. Informative text in a note continues to the end of the paragraph.

For clarity of the definition of those terms, see Core Specification Volume 1, Part E, Section 1.

1.1.2 Reserved for Future Use

Where a field in a packet, Protocol Data Unit (PDU), or other data structure is described as “Reserved for Future Use” (irrespective of whether in uppercase or lowercase), the device creating the structure shall set its value to zero unless otherwise specified. Any device receiving or interpreting the structure shall ignore that field; in particular, it shall not reject the structure because of the value of the field.

Where a field, parameter, or other variable object can take a range of values, and some values are described as “Reserved for Future Use”, a device sending the object shall not set the object to those values. A device receiving an object with such a value should reject it, and any data structure containing it, as being erroneous; however, this does not apply in a context where the object is described as being ignored or it is specified to ignore unrecognized values.

When a field value is a bit field, unassigned bits can be marked as Reserved for Future Use and shall be set to 0. Implementations that receive a message that contains a Reserved for Future Use bit that is set to 1 shall process the message as if that bit was set to 0, except where specified otherwise.

The acronym RFU is equivalent to Reserved for Future Use.

1.1.3 Prohibited

When a field value is an enumeration, unassigned values can be marked as “Prohibited”. These values shall never be used by an implementation, and any message received that includes a Prohibited value shall be ignored and shall not be processed and shall not be responded to.

Where a field, parameter, or other variable object can take a range of values, and some values are described as “Prohibited”, devices shall not set the object to any of those Prohibited values. A device receiving an object with such a value should reject it, and any data structure containing it, as being erroneous.

“Prohibited” is never abbreviated.

2 Values and Represented Values

The characteristic value associated with a characteristic is a raw value that is not self-describing. Each characteristic value contains one or more fields. The interpretation of the meaning of the raw value stored in the characteristic shall be defined in the characteristic definition. Common default rules for interpretation of characteristics representing scalar values and for byte ordering are given in the following subsections. These rules apply unless otherwise overridden by a specific characteristic definition.

2.1 Scalar Values

When a characteristic field represents a scalar value and unless otherwise specified by the characteristic definition, the represented value is related to the raw value by the following equations, where the M coefficient, d, and b exponents are defined per field of characteristic:

$$R = C * M * 10^d * 2^b$$

Where: R = represented value C = raw value M = multiplier, positive or negative integer (between -10 and +10) d = decimal exponent, positive or negative integer b = binary exponent, positive or negative integer

The default values are: M = 1, d = 0 and b = 0.

2.1.1 Example Decimal Exponent

To represent a length in decimeters with a resolution of one decimeter within a characteristic value, the following values are used:

$$M = 1, d = -1, b = 0$$

2.1.2 Example Binary Exponent

To represent a duration in 256ths of a second with a precision of 1/256s within a characteristic value, the following values are used:

$$M = 1, d = 0, b = -8$$

2.1.3 Example Multiplier

To represent the horizontal dilution of precision with an accuracy of 1/5 with a precision of 1/5 within a characteristic value, the following values are used:

$$M = 2, d = -1, b = 0$$

2.2 Octet Ordering

Where characteristics and descriptors are made up of multiple octets, and unless otherwise specified by the characteristic definition, the Least Significant Octet (LSO) is defined as the eight low-numbered bits (i.e. bits 0 to 7) of the top most field in the table. The Most Significant Octet (MSO) is defined as the high-numbered bits of the bottom most field in the table, see example in Table 2.1.

Field	Data Type	Size (in octets)	Field content description
Field 1	xxx	1	Placed on LSO (bits 0 to 7)
...
Field n	xxx	1	Placed on MSO

Table 2.1: Byte Ordering Example Table

2.3 CRC Calculation

If not defined in the service, the CRC is defined using a CRC-CCITT generator polynomial $g(D)=D^{16}+D^{12}+D^5+1$ (i.e. 210041 in octal representation) with a seed of 0xFFFF.

The CRC shift register is filled with 1s before calculating the CRC. Octets are fed through the CRC generator least significant bit first.



The most significant parity octet is transmitted first (where the CRC shift register is viewed as shifting from the least significant bit towards the most significant bit). Therefore, the transmission order of the parity octets within the CRC shift register is as follows:

$$x[8], x[9], \dots, x[15], x[0], x[1]; x[7](last)$$

where $x[15]$ corresponds to the highest power CRC coefficient and $x[0]$ corresponds to the lowest power coefficient. The switch shall be set in position 1 while the data is shifted in. After the last bit has entered the Linear Feedback Shift Register (LFSR), the switch (S) shall be set in position 2, and the register contents shall be read out.

Figure 2.1: LSFR Circuit Generating the CRC

The computation for a sample with 10 bytes of data is the following:

data[0] = 0x3E data[1] = 0x01 data[2] = 0x02 data[3] = 0x03 data[4] = 0x04 data[5] = 0x05 data[6] = 0x06 data[7] = 0x07 data[8] = 0x08 data[9] = 0x09

CRC = 01 2F (LSB ... MSB)

Based on little endianness the output of the shift register is 0x2F01 (MSB...LSB)

Note: See also Volume 2, Part B, Section 7.1.2 in [1] for more details. For E2E-CRC the Linear Feedback Shift Register is initially loaded with a seed of 0xFFFF instead of the UAP and the calculation is done in the same way.

3 Properties

3.1 Ambient Temperature property group

This category contains the property definitions related to the air temperature surrounding a sensor or a device.

3.1.1 Average Ambient Temperature In A Period Of Day property

This property represents an average ambient temperature measured over a period of time during the day. This property can be used to update a column in a histogram. The first value is the average ambient temperature as measured during a period of time, the second value is the start of the period, and the third value is the end of the period.

A period of time is represented with a unit of Decihour (1/10th of a hour, or 6 minutes); a start time of 0 corresponds to midnight (local time), and the maximum value for the end time is 240. The values reported represent the most recent measured average values for the periods in the past 24 hours. For example: if the current time is 11:00, and an average is reported for a time period with a start value of 115 and with an end value of 116 (corresponding to a time period from 11:30 to 11:36) that measurement represents the average temperature of that time period during the previous day. This property does not distinguish between indoor and outdoor ambient temperatures. Typically the use context is derived from the device location properties.

Characteristic: Temperature 8 In A Period Of Day

3.1.2 Indoor Ambient Temperature Statistical Values property

This property represents the most recent average, standard deviation, and minimum and maximum values for a set of measured ambient indoor temperatures, and the period of time over which the measurements were taken.

Characteristic: Temperature 8 Statistics

3.1.3 Outdoor Statistical Values property

This property represents the most recent average, standard deviation, and minimum and maximum values for a set measured ambient outdoor temperatures, and the period of time over which the measurements were taken.

Characteristic: Temperature 8 Statistics

3.1.4 Present Ambient Temperature property

This property represents an ambient air temperature as measured by a temperature sensor. This property does not distinguish between indoor or outdoor temperature. This context is derived from the location of the element when this property is used, for example by using the device location properties. This property can be used if a temperature sensor can be used both indoors and outdoors.

Characteristic: Temperature 8

3.1.5 Present Indoor Ambient Temperature property

This property represents an indoor ambient air temperature as measured by a temperature sensor. This property is typically used for indoor sensors, and is not intended for outdoor use.

Characteristic: Temperature 8

3.1.6 Present Outdoor Ambient Temperature property

This property represents an outdoor ambient air temperature as measured by a temperature sensor. This property is typically for outdoor sensors, and is not intended to be used for indoor sensors.

Characteristic: Temperature 8

3.2 Device Operating Temperature property group

This category contains the definitions of properties related to the operating temperature of device. These properties can, for example, be used to monitor the temperature of an LED fixture or a refrigerator.

3.2.1 Device Operating Temperature Range Specification property

This property represents the minimum, typical, and maximum operating temperatures for the element. These parameters are used to detect under and over temperature events.

Characteristic: Temperature Range

3.2.2 Device Operating Temperature Statistical Values property

This property represents the average, standard deviation, minimum, and maximum operating temperatures and the data recording period as recorded by a temperature sensor. The most recent values are reported. If a value of 0 is reported for the data recording period the statistical values apply to all the measurements taken by the sensor over its lifetime. These life time values for the operating temperature of an LED fixture can be used to predict the remaining lifetime of the fixture, which is strongly dependent on the operating temperature.

Characteristic: Temperature Statistics

3.2.3 Device Over Temperature Event Statistics property

This property represents a count of the total number of operating over-temperature events, the average duration of the events, the time elapsed since the most recent over-temperature event, and the total data recording period. These parameters can be used to verify allowed operation with regard to manufacturer warranty conditions, for example, to indicate that food items in a refrigerator have been exposed to high temperature (such that they should be disposed).

Characteristic: Event Statistics

3.2.4 Device Under Temperature Event Statistics property

This property represents a count of the total number of operating under-temperature events, the average duration of the events, time elapsed since last under-temperature event, and the total data recording period. These parameters can be used, for example, to verify allowed operation with regard to manufacturer warranty conditions.

Characteristic: Event Statistics

3.2.5 Present Device Operating Temperature property

This property represents the current temperature of an element as measured by a temperature sensor.

Characteristic: Temperature

3.2.6 Relative Runtime In A Device Operating Temperature Range property

This property represents a relative runtime of a device within an operating temperature range. The first value (Relative Value) is the relative runtime (runtime within the interval compared with the total runtime recorded by the device - see [Total Device Runtime](#) (Section 3.11.7)). The second and third values (Minimum Value and Maximum Value) define the operating temperature range by specifying minimum and maximum values of the range. This property can be used, for example, to update a column in a histogram in order to see whether the element has been operating within the specified operating temperature boundaries for warranty purposes, or to predict remaining life of the device.

Characteristic: Relative Value in a Temperature Range

3.3 Electrical Input property group

This category contains the definitions of properties related to the electrical input of a device such as input voltage and ripple voltage. These properties can be monitored to ensure that the device is running at the right input conditions. They also can be used to monitor the performance of the electrical power distribution within a building, or to monitor the performance of the power supplies powering a device.

3.3.1 Average Input Current property

This property represents the most recently measured average current for the element. It consists of the average current value and the averaging period.

Characteristic: Average Current

3.3.2 Average Input Voltage property

This property represents the most recently measured average voltage for the element. It consists of the average voltage value and the averaging period.

Characteristic: Average Voltage

3.3.3 Input Current Range Specification property

This property represents the minimum, typical, and maximum input current range specification values. These values can be used together with the measured input currents to check whether or not the device is operating within specification.

Characteristic: Electric Current Specification

3.3.4 Input Current Statistics property

This property represents the most recent average, standard deviation, minimum, and maximum values of the input current and the data recording period.

Characteristic: Electric Current Statistics

3.3.5 Input Over Current Event Statistics property

This property represents a count of the total number of over-current events, the average duration of the events, time elapsed since the most recent over-current event, and the total data recording period. These parameters can be used, for example, to verify allowed operation with regard to manufacturer warranty conditions.

Characteristic: Event Statistics

3.3.6 Input Over Ripple Voltage Event Statistics property

This property represents a count of the total number of over-ripple-voltage events, the average duration of the events, time elapsed since the most recent over-voltage event, and the total data recording period. These parameters can be used, for example, to verify allowed operation with regard to manufacturer warranty conditions.

Characteristic: Event Statistics

3.3.7 Input Over Voltage Event Statistics property

This property represents a count of the total number of over-voltage events, the average duration of the events, time elapsed since the most recent over-voltage event, and the total data recording period. These parameters can be used, for example, to verify allowed operation with regard to manufacturer warranty conditions.

Characteristic: Event Statistics

3.3.8 Input Under Current Event Statistics property

This property represents a count of the total number of under-current events, the average duration of the events, time elapsed since the most recent over-current event, and the total data recording period. These parameters can be used, for example, to verify allowed operation with regard to manufacturer warranty conditions.

Characteristic: Event Statistics

3.3.9 Input Under Voltage Event Statistics property

This property represents a count of the total number of under-voltage events, the average duration of the events, time elapsed since the most recent over-voltage event, and the total data recording period. These parameters can be used, for example, to verify allowed operation with regard to manufacturer warranty conditions.

Characteristic: Event Statistics

3.3.10 Input Voltage Range Specification property

This property represents the minimum, typical, and maximum input voltage range as specified for a device. These values can be used together with the measured input voltages to check if the device is operating within specification.

Characteristic: Voltage Specification

3.3.11 Input Voltage Ripple Specification property

This property represents the maximum allowed relative ripple voltage for the device. The relative ripple voltage is the ripple value divided by the average voltage (as reported by the Electrical Input: Average Voltage property).

Characteristic: Percentage 8

3.3.12 Input Voltage Statistics property

This property represents the most recent average, standard deviation, minimum and maximum values for the input voltage and the data recording period.

Characteristic: Voltage Statistics

3.3.13 Present Input Current property

This property represents the most recently measured input current for the device.

Characteristic: Electric Current

3.3.14 Present Input Ripple Voltage property

This property represents the current measured relative ripple voltage value. The relative ripple voltage is the ripple voltage value divided by the average voltage (as reported by the Electrical Input: Average Voltage property). These values can be used to monitor the performance of power supplies. An increase in the ripple voltage value may indicate that the capacitors in these power supplies are starting to fail. This property can be used as an early sign of power supply failure.

Characteristic: Percentage 8

3.3.15 Present Input Voltage property

This property represents the most recently measured input voltage for the device.

Characteristic: Voltage

3.3.16 Relative Runtime In An Input Current Range property

This property represents a relative runtime of a device within a current range. The first value ('Relative value') is the relative runtime (runtime in the interval compared to the total runtime recorded by the device - see [Total Device Runtime](#) (Section 3.11.7)). The second (Minimum Current) and third values (Maximum Current) define the operating current range as minimum and maximum values of a range. This can be used, for example, to update a column in a histogram in order to see whether or not the device powered by the supply has been operating within the specified current boundaries for warranty purposes, or to predict the remaining life of the device.

Characteristic: Relative Runtime In A Current Range

3.3.17 Relative Runtime In An Input Voltage Range property

This property represents a relative runtime of a device within a voltage range. The first value (Relative Value) is the relative runtime (runtime in the interval compared to the total runtime recorded by the device - see [Total Device Runtime](#) (Section 3.11.7)). The second (Minimum Temperature) and third values (Maximum Temperature) define the operating voltage range as minimum and maximum temperatures of a range. This can be used, for example, to update a column in a histogram in order to see whether or not the device powered by the supply has been operating within the specified voltage boundaries for warranty purposes, or to predict the remaining life of the device.

Characteristic: Relative Value In A Voltage Range

3.4 Energy Management property group

This category contains the definitions of properties related to the energy management of a device. These properties can, for example, be used for monitoring the energy use of devices such as a heater or a light fixture. They enable building information services to report aggregate energy usage, and to report high-energy-use devices. A building operator may use this information to decide which devices to replace with more efficient devices, or to reduce energy usage by reducing the energy-use level or total operating time for high-energy-use devices

3.4.1 Device Energy Use Since Turn On property

This property reports the energy used by the element since it was turned on. The runtime since turn on can be obtained from the Device Information: Runtime Since Turn On property.

Characteristic: Energy

3.4.2 Device Power Range Specification property

The Power Range Specification property represents minimum, typical, and maximum power consumption of the device as specified by the manufacturer of the device.

Characteristic: Power Specification

3.4.3 Present Device Input Power property

This property reports the current power usage of a device. It can be either measured by the device if the device has the capability to measure power directly, or it can be obtained from a mathematical model and a level setting value.

Characteristic: Power

3.4.4 Present Device Operating Efficiency property

This property represents the current power efficiency of the operating device. The power efficiency is defined as the useful output power divided by the total input power of the device. This efficiency is most affected by the current output level or the input power conditions. The reported value either can be determined by measurement, or can be calculated by the device based on manufacturer model data. This value can be used by building management systems to operate devices in a building with greater power efficiency.

Characteristic: Percentage 8

3.4.5 Relative Device Energy Use In A Period Of Day property

This property represents energy use by a device over a period of time during the day. This property can be used to update a column in a histogram.

The first value (Energy Value) is the average of the energy use of the device during a period of time, the second value (Start Time) the start of that time period, and the third value (End Time) is the end of the measurement period. A period of time is represented with a unit of Decihour (1/10th of an hour, or 6 minutes). A start time of 0 corresponds to midnight (local time), and the maximum value for the start time is 23.9.

The values reported represent the most recent measured average values for these periods during the past 24 hours. For example, if the current time is 11:00AM, and an average is reported for a time period with a start value of 11.5 and a end of 11.7 (corresponding to a time period from 11:30AM to 11:42AM), that measurement represents the average energy use during that time period on the previous day.

Characteristic: Energy In A Period Of Day

3.4.6 Total Device Energy Use property

This property represents the total energy used by the device since meter reset. If the meter cannot be reset, the energy usage value is the value measured over the lifetime of the element.

Characteristic: Energy

3.5 General Device Information property group

This category contains property definitions related to general device information such as device appearance, manufacturing data, and total runtime.

3.5.1 Device Appearance property

This property represents the external appearance of the device. A value is composed of a category (10-bits) and a sub-category (6-bits).

Characteristic: Appearance

3.5.2 Device Country Of Origin property

This property represents the country of origin of the device using ISO 3166-1 numeric M49 Country codes as maintained by the United Nations.

Characteristic: Country Code

3.5.3 Device Date Of Manufacture property

This property represents the manufacturing date for the device.

Characteristic: Date UTC

3.5.4 Device Firmware Revision property

This property represents a revision identifier for the firmware within the device. The firmware revision is described by an 8-octet name string.

Characteristic: Fixed String 8

3.5.5 Device Global Trade Item Number property

This property represents a 14-digit Global Trade Item Number, which is typically used in product barcodes.

Characteristic: Global Trade Item Number

3.5.6 Device Hardware Revision property

This property represents the hardware revision for the hardware within the device. The hardware revision is described by a 16-octet size name string.

Characteristic: Fixed String 16

3.5.7 Device Manufacturer Name property

This property represents the name of the manufacturer of the device. This value is set by the manufacturer or supplier of the device.

Characteristic: Fixed String 36

3.5.8 Device Model Number property

This property represents the model number that is assigned by the device vendor. The model number is contained in a 24-octet name string.

Characteristic: Fixed String 24

3.5.9 Device Serial Number property

This property represents the serial number for a particular instance of the device. The serial number is contained in a 16-octet name string.

Characteristic: Fixed String 16

3.5.10 Device Software Revision property

This property represents the software revision for the software within the device. The software revision is described by an 8-octet name string.

Characteristic: Fixed String 8

3.6 Light Control property group

This category contains properties related to light control, and defines, for example, the light control properties set in the Lighting Control Model in the Mesh Model specification.

3.6.1 Light Control Ambient LuxLevel On property

This property represents the minimum ambient illuminance level as measured by a lux sensor that determines if a light or a group of lights transitions from the standby state to a run state. The standby state is a state when the light is switched on and controlled, but operating at minimum level. This minimum level can be zero but can also be set to a low value for security or safety reasons. The run state is a state in which the light is switched on and operating at normal light level.

This property can be used to avoid lights being on during the day with ample daylight in a space.

Characteristic: Illuminance

3.6.2 Light Control Ambient LuxLevel Prolong property

This property represents the ambient light level for a light or a group of lights in the prolong state. The prolong state is the intermediate state in between the run state and the standby state of a light.

Characteristic: Illuminance

3.6.3 Light Control Ambient LuxLevel Standby property

This property represents the ambient light level for a light or a group of lights to remain in a standby state. The standby state is a state when the light is switched on and controlled, but operating at minimum level. This minimum level can be zero but can also be set to a low value so that the lights are never fully turned off.

Characteristic: Illuminance

3.6.4 Light Control Lightness On property

This property represents the light lightness level of a light or a group of lights in a run state.

Characteristic: Perceived Lightness

3.6.5 Light Control Lightness Prolong property

This property represents the light lightness level of a light or a group of lights when in a prolong state.

Characteristic: Perceived Lightness

3.6.6 Light Control Lightness Standby property

This property represents the perceived light lightness level of a light or a group of lights when in a standby state.

Characteristic: Perceived Lightness

3.6.7 Light Control Regulator Accuracy property

This property represents the accuracy of a proportional-integral light regulator. This represents the regulation error that does not result in changing the regulator output.

Characteristic: Percentage 8

3.6.8 Light Control Regulator Kid property

This property represents the integral coefficient K_i in a decreasing output operation mode of a proportional-integral light controller. This represents the integral coefficient when the light is decreasing its light output (indicated by the third character 'd' in 'Kid' representing 'down' as opposed to the coefficient used when the light output is increasing 'Kiu' with 'u' representing 'up').

Characteristic: Coefficient

3.6.9 Light Control Regulator Kiu property

This property represents the integral coefficient K_i in a increasing output operation mode of a proportional-integral light controller. This represents the integral coefficient when the light is increasing its light output (indicated by the third character 'u' in 'Kiu' representing 'up' as opposed to the coefficient used when the light output is increasing 'Kid' with 'd' representing 'down').

Characteristic: Coefficient

3.6.10 Light Control Regulator Kpd property

This property represents the proportional coefficient K_p in a decreasing output operation mode of a proportional-integral light controller. This represents the proportional coefficient when the light is decreasing its light output (indicated by the third character 'd' in 'Kpd' representing 'down' as opposed to the coefficient used when the light output is increasing 'Kpu' with 'u' representing 'up').

Characteristic: Coefficient

3.6.11 Light Control Regulator Kpu property

This property represents the proportional coefficient K_p in a increasing output operation mode of a proportional-integral light controller. This represents the proportional coefficient when the light is increasing its light output (indicated by the third character 'u' in 'Kpu' representing 'up' as opposed to the coefficient used when the light output is increasing 'Kid' with 'd' representing 'down').

Characteristic: Coefficient

3.6.12 Light Control Time Fade property

This property represents the time a light takes to transition from a run state to a prolong state. The run state is the state when the light is running at normal light level, the prolong state is an intermediate state of a light between the run state and the standby state.

Characteristic: Time Millisecond 24

3.6.13 Light Control Time Fade On property

This property represents the time lights take to transition from a standby state to a run state.

Characteristic: Time Millisecond 24

3.6.14 Light Control Time Fade Standby Auto property

This property represents the time lights transition from a prolong state to a standby state when the transition is automatic (such as when triggered by an occupancy or light sensor).

Characteristic: Time Millisecond 24

3.6.15 Light Control Time Fade Standby Manual property

This property represents the time lights take to transition from a prolong state to an standby state when the transition is triggered by a manual operation (for example by a user operating a light switch).

Characteristic: Time Millisecond 24

3.6.16 Light Control Time Occupancy Delay property

This property represents the time delay between receiving a signal from an occupancy sensor and a light controller executing a state change as a result of the signal. This property can, for example, be used to synchronize state changes between multiple lights.

Characteristic: Time Millisecond 24

3.6.17 Light Control Time Prolong property

This property represents the duration of the prolong state which is the state of a device between its run state and its standby state.

Characteristic: Time Millisecond 24

3.6.18 Light Control Time Run On property

This property represents the duration of the run state after last occupancy was detected. This duration can be used to prevent lights from entering a standby state, for example, when people are still in a room and occupancy detectors fail to detect occupancy (which could occur, for example, with passive infrared motion sensors and people in the room not moving for a period of time).

Characteristic: Time Millisecond 24

3.7 Lighting property group

This category contains properties related to general lighting, light sources, and light fixtures. It does not define properties related to light control (see [Light Control](#) (Section 3.6), Light LC for these properties). It also does not define properties related to detection of light (see [Photometry](#) (Section 3.9), Photometry for these).

3.7.1 Center Beam Intensity At Full Power property

This property represents the maximum center beam intensity of a beam of light, for example as produced by a spot light fixture or a car headlight.

Characteristic: Luminous Intensity

3.7.2 Chromaticity Tolerance property

This property represents the tolerance as a circle in the CIE 1976 (u',v') diagram of the chromaticity of the light produced by a device, such as a light source or a lighting fixture. This tolerance can, for example, be dependent on the current setting, temperature, or operating history of the device. It can be used to decide when to replace a light in quality-sensitive lighting applications.

Characteristic: Chromaticity Tolerance

3.7.3 Color Rendering Index R9 property

This property represents the Color Rendering Index R9 value of the light output of a lamp or light fixture calculated in accordance with CIE standard CIE 13.3-1995 "Method of Measuring and Specifying Color Rendering Properties of Light Sources." The R9 value is the ninth index of the set provided by the CIE 13.3-1995 standard. It represents the precision of the rendering of red color patches, and can be an indication of how well skin tones are rendered. This index value can be dependent on the operating conditions. The value reported by the property represents the Color Rendering Index at its present state.

Characteristic: CIE 13.3-1995 Color Rendering Index

3.7.4 Color Rendering Index Ra property

This property represents the Color Rendering Index Ra value of the light output of a lamp or light fixture calculated in accordance with CIE standard CIE 13.3-1995 "Method of Measuring and Specifying Color Rendering Properties of Light Sources." The Ra value is the average of the color rendering indexes (indexes 1 through 8). This index value can be dependent on the operating conditions. The value reported by the property represents the Color Rendering Index at its present state.

Characteristic: CIE 13.3-1995 Color Rendering Index

3.7.5 Luminous Efficacy property

This property represents the present luminous efficacy of a light source or a lighting fixture. The luminous efficacy is defined as the luminous flux produced by the device divided by its electrical input. Luminous efficacy typically is dependent on drive conditions, and the value reported represents the efficacy at present drive conditions.

Characteristic: Luminous Efficacy

3.7.6 Luminous Energy Since Turn On property

This property represents the luminous energy produced by a light source or a lighting fixture since it was turned on.

Characteristic: Luminous Energy

3.7.7 Relative Runtime In A Correlated Color Temperature Range property

This property represents a relative runtime of a device in a correlated color temperature range. The first value ('Relative value') is the relative runtime (runtime in the interval compared to the total runtime recorded by the device - see [Total Device Runtime](#) (Section 3.11.7)). The second ('Minimum value') and third values ('Maximum value') define the correlated color temperature range as minimum and maximum values of a range. This can be used, for example, to update a column in a histogram in order to see if the device powered by the supply has been operating within the specified correlated color temperature boundaries for warranty purposes, or to predict the remaining life of the device.

Characteristic: Luminous Energy

3.7.8 Total Luminous Energy property

This property represents the total recorded luminous energy produced by a light source or a lighting fixture.

Characteristic: Luminous Energy

3.8 Occupancy property group

This category contains properties related to occupancy of spaces. The occupancy properties are related to people, but also to cars (in parking garages), animals (on farms), and units within a building (for example, rental units or hotel rooms).

3.8.1 Motion Sensed property

This property represents the activity level, as, for example, detected by a motion sensor. Typically, this is detected by a Passive Infrared (PIR) sensor. The motion activity is represented by a relative value ranging from 0 percent to 100 percent, with 100 percent the maximum activity that the sensor can record.

Characteristic: Percentage 8

3.8.2 Motion Threshold property

This property represents the activity level, for example, as detected by a motion sensor, below which Occupancy Presence is not reported. For instance, a Passive Infrared (PIR) sensor does not report presence when activity level is below this value. The motion activity is represented by a relative value ranging from 0 percent to 100 percent, with 100 percent the maximum activity that the sensor can record.

Characteristic: Percentage 8

3.8.3 People Count property

This property represents the number of people currently present in a space or in a building. This property can for example be measured by counting the number of people entering and leaving a space, or by using a camera.

Characteristic: Count 16

3.8.4 Presence Detected property

This property represents whether or not an occupant is detected within range of the occupancy detector.

Characteristic: Boolean

3.8.5 Time Since Motion Sensed property

This property represents the time that has elapsed since the sensor last detected any activity. This value can, for example, be used to turn off lights in the absence of any activity in a space.

Characteristic: Time Second 16

3.8.6 Time Since Presence Detected property

This property represents the time that has elapsed since the sensor last detected presence. This value can, for example, be used to turn off lights in the absence of any activity in a space.

Characteristic: Time Second 16

3.9 Photometry property group

This category contains property definitions for quantities related to photometrics. These typically are measured with photodetectors.

3.9.1 Initial CIE 1931 Chromaticity Coordinates property

This property represents the initial chromaticity coordinates x and y of a device using CIE 1931 C_x and C_y chromaticity coordinates at first use of the device. The value typically is measured by a spectrometer or a chroma meter, but can also be reported by a device that is aware of its chromaticity values, either by measurement or as a result of an association of its operating parameters with a color model. The property value typically is configured by the manufacturer of the device.

Characteristic: Chromaticity Coordinates

3.9.2 Initial Correlated Color Temperature property

This property represents the initial correlated color temperature associated with a device such as a color-tunable light. The value typically is measured by a spectrometer or a chroma meter, but can also be reported by a device that is aware of its chromaticity values, either by measurement or as a result of an association of its operating parameters with a color model. This property typically is configured by the manufacturer of the device.

Characteristic: Correlated Color Temperature

3.9.3 Initial Luminous Flux property

This property represents the maximum luminous output flux capability of a device at time of first use of the device. This value is typically configured by the manufacturer of the device.

Characteristic: Luminous Flux

3.9.4 Initial Planckian Distance property

This property represents the distance of a chromaticity coordinate from the Planckian locus on the $(u', 2/3v')$ diagram as defined by ANSI standard C78.377-2008 at first use of the device. The value typically is measured by a spectrometer or a chroma meter, but can also be reported by a device which is aware of its chromaticity values, either by measurement, or as a result of an association of its operating parameters with a color model. This property is typically configured by the manufacturer of the device.

Characteristic: Chromatic Distance From Planckian

3.9.5 Lumen Maintenance Factor property

This property represents the current maximum luminous flux capability of a lamp or lighting fixture relative the initial maximum luminous flux capability. This value can be measured using an integrated sensor of a device but will be typically be calculated based on its operational runtime and other operating history parameters based on a mathematical model.

Characteristic: Percentage 8

3.9.6 Luminous Exposure property

This property represents the total recorded luminous exposure as measured by a lux meter.

This property can be used to monitor luminous exposure of an illuminated work of art and adjust light levels or to take the art piece out of the exhibition when the exposure is too high.

Characteristic: Luminous Exposure

3.9.7 Luminous Flux Range property

This property represents the luminous flux range of a device as specified by the manufacturer of a light source or a lighting fixture.

The first value (Minimum Luminous Flux) represents the start of the range and the second value (Maximum Luminous Flux) represents the end of the range.

Characteristic: Luminous Flux Range

3.9.8 Present Ambient Light Level property

This property represents the light level as measured by a light sensor measuring illuminance (Lux).

Characteristic: Illuminance

3.9.9 Present CIE 1931 Chromaticity Coordinates property

This property represents the chromaticity coordinates x and y of a device using CIE 1931 C_x and C_y chromaticity coordinates. The value typically is measured by a spectrometer or a chroma meter, but it can also be reported by a device that is aware of its chromaticity values, either by measurement or as a result of an association of its operating parameters with a color model.

Characteristic: Chromaticity Coordinates

3.9.10 Present Correlated Color Temperature property

This property represents the present correlated color temperature associated with a device such as a color tunable light. The value typically is measured by a spectrometer or a chroma meter, but it can also be reported by a device that is aware of its chromaticity values, either by measurement, or as a result of an association of its operating parameters with a color model.

Characteristic: Correlated Color Temperature

3.9.11 Present Illuminance property

This property represents the illuminance as currently measured by a lux meter.

Characteristic: Illuminance

3.9.12 Present Luminous Flux property

This property represents the luminous flux as currently output by a device.

Characteristic: Luminous Flux

3.9.13 Present Planckian Distance property

This property represents the present distance of a chromaticity coordinate from the Planckian locus on the $(u', 2/3v')$ diagram as defined by ANSI standard C78.377-2008. The value typically is measured by a spectrometer or a chroma meter, but also can be reported by a device that is aware of its chromaticity values, either by measurement, or as a result of an association of its operating parameters with a color model.

Characteristic: Chromatic Distance From Planckian

3.9.14 Relative Exposure Time In An Illuminance Range property

This property represents a relative exposure time of a light sensor (typically a photodetector) in an illuminance range.

The first value (Relative Value) is the relative exposure time (that is, exposure time during the illuminance interval compared with the total exposure time recorded by the sensor - See [Total Light Exposure Time](#) (Section 3.9.15)).

The second and third values (Minimum Value and Maximum Value) define the illuminance range by specifying the minimum and maximum value of the range.

This property can, for example, be used to update a column in a histogram that is used by curators in a museum to adjust light levels or reduce the hours of display for a particular piece of art.

Characteristic: Relative Value In An Illuminance Range

3.9.15 Total Light Exposure Time property

This property represents the total recorded sensing duration of a light sensor (typically a photodetector).

This property typically can, for example, be used in combination with the Relative Exposure Time In An Illuminance Range property to calculate absolute exposure times of an illuminated work of art as presented in a histogram.

Characteristic: Time Hour 24

Referenced by:

- [Relative Exposure Time In An Illuminance Range](#) (Section 3.9.14)

3.10 Power Supply Output property group

This section contains definitions of properties related to the electrical output of a power supply such as output voltage, output ripple voltage, and output current. These values can be used to monitor drive conditions and electrical operating history for light sources such as LED arrays.

3.10.1 Average Output Current property

This property represents the average output current for the device. This property consists of two fields: the first value (Electric Current Value) is the average current of a set of current values, and the second value (Sensing Duration) the period over which the set of values were measured.

Characteristic: Average Current

3.10.2 Average Output Voltage property

This property represents the average output voltage for the device. This property consists of two fields: the first value (Voltage Value) is the average voltage of a set of voltage values, and the second value (Sensing Duration) the period over which the set of values were measured.

Characteristic: Average Voltage

Referenced by:

- [Present Relative Output Ripple Voltage](#) (Section 3.10.12)
- [Output Ripple Voltage Specification](#) (Section 3.10.6)

3.10.3 Open Circuit Event Statistics property

This property represents the open circuit event statistics and is composed of four values. The first value (Number Of Events) represents the count of open circuit events. The second value (Average Event Duration) represents the average duration of all the open circuit events in the data recording period. The third value (Time Elapsed Since Last Event) represents the time elapsed since the last open circuit event occurred. The fifth and last field (Sensing Duration) represents the total data recording period.

Characteristic: Event Statistics

3.10.4 Output Current Range property

This property represents a current output range of a device and consists of two fields: this first field (Minimum Electric Current) represents the minimum current and the second field (Maximum Electric Current) represents the maximum output current of a current range for a device.

Characteristic: Electric Current Range

3.10.5 Output Current Statistics property

This property represents a set of statistical values for the output current of a device. It consists of 5 fields. The first field (Average Electric Current Value) represents the average current of a set of measured current values over a period of time. The second field (Standard Deviation Electric Current Value) represents the standard deviation of a set of measured current values over a period of time. The third field (Minimum Electric Current Value) represents the minimum of a set of measured current values over a period of time. The fourth field (Maximum Electric Current Value) represents the maximum of a set of measured current values over a period of time. The fifth and last field (Sensing Duration) represents the total data recording period.

Characteristic: Electric Current Statistics

3.10.6 Output Ripple Voltage Specification property

This property represents the maximum allowed relative ripple voltage for the device. The relative ripple voltage is the ripple value divided by the average output voltage (see [Average Output Voltage](#) (Section 3.10.2) property).

Characteristic: Percentage 8

3.10.7 Output Voltage Range property

This property represents the minimum and maximum output voltage of the power supply.

Characteristic: Voltage Specification

3.10.8 Output Voltage Statistics property

This property represents a set of statistical values for the output voltage of a device. It consists of 5 fields. The first field (Average Voltage Value) represents the average voltage of a set of measured voltage values over a period of time. The second field (Standard Deviation Voltage Value) represents the standard deviation of a set of measured voltage values over a period of time. The third field (Minimum Electric voltage Value) represents the minimum of a set of measured voltage values over a period of time. The fourth field (Maximum Electric voltage Value) represents the maximum of a set of measured voltage values over a period of time. The fifth and last field (Sensing Duration) represents the total data recording period.

Characteristic: Voltage Statistics

3.10.9 Over Output Ripple Voltage Event Statistics property

This property represents the over output ripple voltage event statistics and is composed of four values. The first value (Number Of Events) represents the count of over output ripple voltage events. The second value (Average Event Duration) represents the average duration of all the over output ripple voltage events in the data recording period. The third value (Time Elapsed Since Last Event) represents the time elapsed since the last over output ripple voltage event occurred. The fifth and last field (Sensing Duration) represents the total data recording period.

Characteristic: Event Statistics

3.10.10 Present Output Current property

This property represents the present output current for the device.

Characteristic: Electric Current

3.10.11 Present Output Voltage property

This property represents the present output voltage of the power supply.

Characteristic: Voltage

3.10.12 Present Relative Output Ripple Voltage property

This property represents the most recently measured relative ripple voltage value. The relative ripple voltage is the ripple voltage value divided by the average voltage (as reported by the [Average Output Voltage](#) (Section 3.10.2) property). These values can be used to monitor the performance of power supplies, because an increase in the ripple voltage value may indicate that the capacitors in these power supplies are starting to fail. This property can be used as an early sign of power supply failure.

Characteristic: Percentage 8

3.10.13 Short Circuit Event Statistics property

This property represents the short circuit event statistics and is composed of four values. The first value (Number Of Events) represents the count of short circuit events. The second value (Average Event Duration) represents the average duration of all the short circuit events in the data recording period. The third value (Time Elapsed Since Last Event) represents the time elapsed since the last short circuit event occurred. The fourth and last field (Sensing Duration) represents the total data recording period.

Characteristic: Event Statistics

3.11 Warranty and Service property group

This category contains property definitions related to warranty and service of a device—for example, the total runtime of a device and the warranty runtime as provided by the manufacturer. The two properties in this category can be used to check whether or not the device is still covered by a runtime warranty.

3.11.1 Device Runtime Since Turn On property

This property represents the total time the element has been operating in the On-state since it was turned on the last time. A value of 0 represents that the run time is not known.

Characteristic: Time Hour 24

3.11.2 Device Runtime Warranty property

This property represents the total operating time covered by the warranty.

Characteristic: Time Hour 24

3.11.3 Relative Device Runtime In A Generic Level Range property

This property represents a relative runtime of a device within a generic level range.

The first value (Relative Value) is the relative runtime (runtime within the interval compared with the total runtime recorded by the device - see Total Runtime).

The second and third values (Minimum Level Value and Maximum Level Value) define the generic level range by specifying a minimum value and the size of the range.

This can be used, for example, to update a column in a histogram, or to predict the remaining life of the device.

Characteristic: Relative Runtime In A Generic Level Range

3.11.4 Total Device Off On Cycles property

This property represents the total recorded count of transitions from an Off-state to an On-state for a device.

Characteristic: Count 24

3.11.5 Total Device Power On Cycles property

This property represents the total recorded power-on event count for a device.

Characteristic: Count 24

3.11.6 Total Device Power On Time property

This property represents the total of the recorded duration the device has been powered on. A value of 0 represents that this time is not known.

Characteristic: Time Hour 24

3.11.7 Total Device Runtime property

This property represents the total time that the element has been operating (has been in an On-state).

Characteristic: Time Hour 24

Referenced by:

- [Relative Runtime In A Device Operating Temperature Range](#) (Section 3.2.6)
- [Relative Runtime In An Input Voltage Range](#) (Section 3.3.17)
- [Relative Runtime In An Input Current Range](#) (Section 3.3.16)
- [Relative Runtime In A Correlated Color Temperature Range](#) (Section 3.7.7)

4 Summary

4.1 Property summary

4.1.1 Properties by name

Property	Characteristic
Average Ambient Temperature In A Period Of Day	Temperature 8 In A Period Of Day
Average Input Current	Average Current
Average Input Voltage	Average Voltage
Average Output Current	Average Current
Average Output Voltage	Average Voltage
Center Beam Intensity At Full Power	Luminous Intensity
Chromaticity Tolerance	Chromaticity Tolerance
Color Rendering Index R9	CIE 13.3-1995 Color Rendering Index
Color Rendering Index Ra	CIE 13.3-1995 Color Rendering Index
Device Appearance	Appearance
Device Country Of Origin	Country Code
Device Date Of Manufacture	Date UTC
Device Energy Use Since Turn On	Energy
Device Firmware Revision	Fixed String 8
Device Global Trade Item Number	Global Trade Item Number
Device Hardware Revision	Fixed String 16
Device Manufacturer Name	Fixed String 36
Device Model Number	Fixed String 24
Device Operating Temperature Range Specification	Temperature Range

Property	Characteristic
Device Operating Temperature Statistical Values	Temperature Statistics
Device Over Temperature Event Statistics	Event Statistics
Device Power Range Specification	Power Specification
Device Runtime Since Turn On	Time Hour 24
Device Runtime Warranty	Time Hour 24
Device Serial Number	Fixed String 16
Device Software Revision	Fixed String 8
Device Under Temperature Event Statistics	Event Statistics
Indoor Ambient Temperature Statistical Values	Temperature 8 Statistics
Initial CIE 1931 Chromaticity Coordinates	Chromaticity Coordinates
Initial Correlated Color Temperature	Correlated Color Temperature
Initial Luminous Flux	Luminous Flux
Initial Planckian Distance	Chromatic Distance From Planckian
Input Current Range Specification	Electric Current Specification
Input Current Statistics	Electric Current Statistics
Input Over Current Event Statistics	Event Statistics
Input Over Ripple Voltage Event Statistics	Event Statistics
Input Over Voltage Event Statistics	Event Statistics
Input Under Current Event Statistics	Event Statistics
Input Under Voltage Event Statistics	Event Statistics
Input Voltage Range Specification	Voltage Specification
Input Voltage Ripple Specification	Percentage 8
Input Voltage Statistics	Voltage Statistics
Light Control Ambient LuxLevel On	Illuminance
Light Control Ambient LuxLevel Prolong	Illuminance
Light Control Ambient LuxLevel Standby	Illuminance
Light Control Lightness On	Perceived Lightness
Light Control Lightness Prolong	Perceived Lightness

Property	Characteristic
Light Control Lightness Standby	Perceived Lightness
Light Control Regulator Accuracy	Percentage 8
Light Control Regulator Kid	Coefficient
Light Control Regulator Kiu	Coefficient
Light Control Regulator Kpd	Coefficient
Light Control Regulator Kpu	Coefficient
Light Control Time Fade	Time Millisecond 24
Light Control Time Fade On	Time Millisecond 24
Light Control Time Fade Standby Auto	Time Millisecond 24
Light Control Time Fade Standby Manual	Time Millisecond 24
Light Control Time Occupancy Delay	Time Millisecond 24
Light Control Time Prolong	Time Millisecond 24
Light Control Time Run On	Time Millisecond 24
Lumen Maintenance Factor	Percentage 8
Luminous Efficacy	Luminous Efficacy
Luminous Energy Since Turn On	Luminous Energy
Luminous Exposure	Luminous Exposure
Luminous Flux Range	Luminous Flux Range
Motion Sensed	Percentage 8
Motion Threshold	Percentage 8
Open Circuit Event Statistics	Event Statistics
Outdoor Statistical Values	Temperature 8 Statistics
Output Current Range	Electric Current Range
Output Current Statistics	Electric Current Statistics
Output Ripple Voltage Specification	Percentage 8
Output Voltage Range	Voltage Specification
Output Voltage Statistics	Voltage Statistics
Over Output Ripple Voltage Event Statistics	Event Statistics
People Count	Count 16
Presence Detected	Boolean
Present Ambient Light Level	Illuminance

Property	Characteristic
Present Ambient Temperature	Temperature 8
Present CIE 1931 Chromaticity Coordinates	Chromaticity Coordinates
Present Correlated Color Temperature	Correlated Color Temperature
Present Device Input Power	Power
Present Device Operating Efficiency	Percentage 8
Present Device Operating Temperature	Temperature
Present Illuminance	Illuminance
Present Indoor Ambient Temperature	Temperature 8
Present Input Current	Electric Current
Present Input Ripple Voltage	Percentage 8
Present Input Voltage	Voltage
Present Luminous Flux	Luminous Flux
Present Outdoor Ambient Temperature	Temperature 8
Present Output Current	Electric Current
Present Output Voltage	Voltage
Present Planckian Distance	Chromatic Distance From Planckian
Present Relative Output Ripple Voltage	Percentage 8
Relative Device Energy Use In A Period Of Day	Energy In A Period Of Day
Relative Device Runtime In A Generic Level Range	Relative Runtime In A Generic Level Range
Relative Exposure Time In An Illuminance Range	Relative Value In An Illuminance Range
Relative Runtime In A Correlated Color Temperature Range	Luminous Energy
Relative Runtime In A Device Operating Temperature Range	Relative Value in a Temperature Range
Relative Runtime In An Input Current Range	Relative Runtime In A Current Range
Relative Runtime In An Input Voltage Range	Relative Value In A Voltage Range
Short Circuit Event Statistics	Event Statistics
Time Since Motion Sensed	Time Second 16

Property	Characteristic
Time Since Presence Detected	Time Second 16
Total Device Energy Use	Energy
Total Device Off On Cycles	Count 24
Total Device Power On Cycles	Count 24
Total Device Power On Time	Time Hour 24
Total Device Runtime	Time Hour 24
Total Light Exposure Time	Time Hour 24
Total Luminous Energy	Luminous Energy

Table 4.1: Properties by name

4.1.2 Properties by characteristic

Characteristic	Property
Average Current	Average Input Current
	Average Output Current
Average Voltage	Average Input Voltage
	Average Output Voltage
Boolean	Presence Detected
Chromatic Distance From Planckian	Initial Planckian Distance
	Present Planckian Distance
Chromaticity Coordinates	Initial CIE 1931 Chromaticity Coordinates
	Present CIE 1931 Chromaticity Coordinates
Chromaticity Tolerance	Chromaticity Tolerance
CIE 13.3-1995 Color Rendering Index	Color Rendering Index R9
	Color Rendering Index Ra
Coefficient	Light Control Regulator Kid
	Light Control Regulator Kiu
	Light Control Regulator Kpd
	Light Control Regulator Kpu
Correlated Color Temperature	Initial Correlated Color Temperature
	Present Correlated Color Temperature

Characteristic	Property
Count 16	People Count
Count 24	Total Device Off On Cycles
	Total Device Power On Cycles
Country Code	Device Country Of Origin
Electric Current	Present Input Current
	Present Output Current
Electric Current Range	Output Current Range
Electric Current Specification	Input Current Range Specification
Electric Current Statistics	Input Current Statistics
	Output Current Statistics
Date UTC	Device Date Of Manufacture
Energy	Device Energy Use Since Turn On
	Total Device Energy Use
Energy In A Period Of Day	Relative Device Energy Use In A Period Of Day
Event Statistics	Device Over Temperature Event Statistics
	Device Under Temperature Event Statistics
	Input Over Current Event Statistics
	Input Over Ripple Voltage Event Statistics
	Input Over Voltage Event Statistics
	Input Under Current Event Statistics
	Input Under Voltage Event Statistics
	Open Circuit Event Statistics
	Over Output Ripple Voltage Event Statistics
	Short Circuit Event Statistics
Fixed String 16	Device Hardware Revision
	Device Serial Number
Fixed String 24	Device Model Number
Fixed String 36	Device Manufacturer Name
Fixed String 8	Device Firmware Revision
	Device Software Revision
Appearance	Device Appearance
Global Trade Item Number	Device Global Trade Item Number

Characteristic	Property
Illuminance	Light Control Ambient LuxLevel On
	Light Control Ambient LuxLevel Prolong
	Light Control Ambient LuxLevel Standby
	Present Ambient Light Level
	Present Illuminance
Luminous Efficacy	Luminous Efficacy
Luminous Energy	Luminous Energy Since Turn On
	Relative Runtime In A Correlated Color Temperature Range
	Total Luminous Energy
Luminous Exposure	Luminous Exposure
Luminous Flux	Initial Luminous Flux
	Present Luminous Flux
Luminous Flux Range	Luminous Flux Range
Luminous Intensity	Center Beam Intensity At Full Power
Perceived Lightness	Light Control Lightness On
	Light Control Lightness Prolong
	Light Control Lightness Standby
Percentage 8	Input Voltage Ripple Specification
	Present Input Ripple Voltage
	Present Device Operating Efficiency
	Light Control Regulator Accuracy
	Motion Sensed
	Motion Threshold
	Lumen Maintenance Factor
	Output Ripple Voltage Specification
	Present Relative Output Ripple Voltage
Power	Present Device Input Power
Power Specification	Device Power Range Specification
Relative Runtime In A Current Range	Relative Runtime In An Input Current Range
Relative Runtime In A Generic Level Range	Relative Device Runtime In A Generic Level Range

Characteristic	Property
Relative Value in a Temperature Range	Relative Runtime In A Device Operating Temperature Range
Relative Value In A Voltage Range	Relative Runtime In An Input Voltage Range
Relative Value In An Illuminance Range	Relative Exposure Time In An Illuminance Range
Temperature	Present Device Operating Temperature
Temperature 8	Present Ambient Temperature
	Present Indoor Ambient Temperature
	Present Outdoor Ambient Temperature
Temperature 8 In A Period Of Day	Average Ambient Temperature In A Period Of Day
Temperature 8 Statistics	Indoor Ambient Temperature Statistical Values
	Outdoor Statistical Values
Temperature Range	Device Operating Temperature Range Specification
Temperature Statistics	Device Operating Temperature Statistical Values
Time Hour 24	Total Light Exposure Time
	Device Runtime Since Turn On
	Device Runtime Warranty
	Total Device Power On Time
	Total Device Runtime
Time Millisecond 24	Light Control Time Fade
	Light Control Time Fade On
	Light Control Time Fade Standby Auto
	Light Control Time Fade Standby Manual
	Light Control Time Occupancy Delay
	Light Control Time Prolong
	Light Control Time Run On
Time Second 16	Time Since Motion Sensed
	Time Since Presence Detected
Voltage	Present Input Voltage
	Present Output Voltage
Voltage Specification	Input Voltage Range Specification
	Output Voltage Range
Voltage Statistics	Input Voltage Statistics

Characteristic	Property
	Output Voltage Statistics

Table 4.2: Properties by characteristic

4.1.3 Property identifiers

Property ID	Property Name
0x0000	Prohibited
0x0001	Average Ambient Temperature In A Period Of Day
0x0002	Average Input Current
0x0003	Average Input Voltage
0x0004	Average Output Current
0x0005	Average Output Voltage
0x0006	Center Beam Intensity At Full Power
0x0007	Chromaticity Tolerance
0x0008	Color Rendering Index R9
0x0009	Color Rendering Index Ra
0x000A	Device Appearance
0x000B	Device Country Of Origin
0x000C	Device Date Of Manufacture
0x000D	Device Energy Use Since Turn On
0x000E	Device Firmware Revision
0x000F	Device Global Trade Item Number
0x0010	Device Hardware Revision
0x0011	Device Manufacturer Name
0x0012	Device Model Number
0x0013	Device Operating Temperature Range Specification
0x0014	Device Operating Temperature Statistical Values
0x0015	Device Over Temperature Event Statistics
0x0016	Device Power Range Specification
0x0017	Device Runtime Since Turn On
0x0018	Device Runtime Warranty

Property ID	Property Name
0x0019	Device Serial Number
0x001A	Device Software Revision
0x001B	Device Under Temperature Event Statistics
0x001C	Indoor Ambient Temperature Statistical Values
0x001D	Initial CIE 1931 Chromaticity Coordinates
0x001E	Initial Correlated Color Temperature
0x001F	Initial Luminous Flux
0x0020	Initial Planckian Distance
0x0021	Input Current Range Specification
0x0022	Input Current Statistics
0x0023	Input Over Current Event Statistics
0x0024	Input Over Ripple Voltage Event Statistics
0x0025	Input Over Voltage Event Statistics
0x0026	Input Under Current Event Statistics
0x0027	Input Under Voltage Event Statistics
0x0028	Input Voltage Range Specification
0x0029	Input Voltage Ripple Specification
0x002A	Input Voltage Statistics
0x002B	Light Control Ambient LuxLevel On
0x002C	Light Control Ambient LuxLevel Prolong
0x002D	Light Control Ambient LuxLevel Standby
0x002E	Light Control Lightness On
0x002F	Light Control Lightness Prolong
0x0030	Light Control Lightness Standby
0x0031	Light Control Regulator Accuracy
0x0032	Light Control Regulator Kid
0x0033	Light Control Regulator Kiu
0x0034	Light Control Regulator Kpd
0x0035	Light Control Regulator Kpu
0x0036	Light Control Time Fade
0x0037	Light Control Time Fade On

Property ID	Property Name
0x0038	Light Control Time Fade Standby Auto
0x0039	Light Control Time Fade Standby Manual
0x003A	Light Control Time Occupancy Delay
0x003B	Light Control Time Prolong
0x003C	Light Control Time Run On
0x003D	Lumen Maintenance Factor
0x003E	Luminous Efficacy
0x003F	Luminous Energy Since Turn On
0x0040	Luminous Exposure
0x0041	Luminous Flux Range
0x0042	Motion Sensed
0x0043	Motion Threshold
0x0044	Open Circuit Event Statistics
0x0045	Outdoor Statistical Values
0x0046	Output Current Range
0x0047	Output Current Statistics
0x0048	Output Ripple Voltage Specification
0x0049	Output Voltage Range
0x004A	Output Voltage Statistics
0x004B	Over Output Ripple Voltage Event Statistics
0x004C	People Count
0x004D	Presence Detected
0x004E	Present Ambient Light Level
0x004F	Present Ambient Temperature
0x0050	Present CIE 1931 Chromaticity Coordinates
0x0051	Present Correlated Color Temperature
0x0052	Present Device Input Power
0x0053	Present Device Operating Efficiency
0x0054	Present Device Operating Temperature
0x0055	Present Illuminance
0x0056	Present Indoor Ambient Temperature

Property ID	Property Name
0x0057	Present Input Current
0x0058	Present Input Ripple Voltage
0x0059	Present Input Voltage
0x005A	Present Luminous Flux
0x005B	Present Outdoor Ambient Temperature
0x005C	Present Output Current
0x005D	Present Output Voltage
0x005E	Present Planckian Distance
0x005F	Present Relative Output Ripple Voltage
0x0060	Relative Device Energy Use In A Period Of Day
0x0061	Relative Device Runtime In A Generic Level Range
0x0062	Relative Exposure Time In An Illuminance Range
0x0063	Relative Runtime In A Correlated Color Temperature Range
0x0064	Relative Runtime In A Device Operating Temperature Range
0x0065	Relative Runtime In An Input Current Range
0x0066	Relative Runtime In An Input Voltage Range
0x0067	Short Circuit Event Statistics
0x0068	Time Since Motion Sensed
0x0069	Time Since Presence Detected
0x006A	Total Device Energy Use
0x006B	Total Device Off On Cycles
0x006C	Total Device Power On Cycles
0x006D	Total Device Power On Time
0x006E	Total Device Runtime
0x006F	Total Light Exposure Time
0x0070	Total Luminous Energy
All other values	Reserved for Future Use

Table 4.3: Property identifiers

4.1.4 Property identifiers by property name

Property Name	Property ID
Average Ambient Temperature In A Period Of Day	0x0001
Average Input Current	0x0002
Average Input Voltage	0x0003
Average Output Current	0x0004
Average Output Voltage	0x0005
Center Beam Intensity At Full Power	0x0006
Chromaticity Tolerance	0x0007
Color Rendering Index R9	0x0008
Color Rendering Index Ra	0x0009
Device Appearance	0x000A
Device Country Of Origin	0x000B
Device Date Of Manufacture	0x000C
Device Energy Use Since Turn On	0x000D
Device Firmware Revision	0x000E
Device Global Trade Item Number	0x000F
Device Hardware Revision	0x0010
Device Manufacturer Name	0x0011
Device Model Number	0x0012
Device Operating Temperature Range Specification	0x0013
Device Operating Temperature Statistical Values	0x0014
Device Over Temperature Event Statistics	0x0015
Device Power Range Specification	0x0016
Device Runtime Since Turn On	0x0017
Device Runtime Warranty	0x0018
Device Serial Number	0x0019
Device Software Revision	0x001A
Device Under Temperature Event Statistics	0x001B
Indoor Ambient Temperature Statistical Values	0x001C
Initial CIE 1931 Chromaticity Coordinates	0x001D
Initial Correlated Color Temperature	0x001E

Property Name	Property ID
Initial Luminous Flux	0x001F
Initial Planckian Distance	0x0020
Input Current Range Specification	0x0021
Input Current Statistics	0x0022
Input Over Current Event Statistics	0x0023
Input Over Ripple Voltage Event Statistics	0x0024
Input Over Voltage Event Statistics	0x0025
Input Under Current Event Statistics	0x0026
Input Under Voltage Event Statistics	0x0027
Input Voltage Range Specification	0x0028
Input Voltage Ripple Specification	0x0029
Input Voltage Statistics	0x002A
Light Control Ambient LuxLevel On	0x002B
Light Control Ambient LuxLevel Prolong	0x002C
Light Control Ambient LuxLevel Standby	0x002D
Light Control Lightness On	0x002E
Light Control Lightness Prolong	0x002F
Light Control Lightness Standby	0x0030
Light Control Regulator Accuracy	0x0031
Light Control Regulator Kid	0x0032
Light Control Regulator Kiu	0x0033
Light Control Regulator Kpd	0x0034
Light Control Regulator Kpu	0x0035
Light Control Time Fade	0x0036
Light Control Time Fade On	0x0037
Light Control Time Fade Standby Auto	0x0038
Light Control Time Fade Standby Manual	0x0039
Light Control Time Occupancy Delay	0x003A
Light Control Time Prolong	0x003B
Light Control Time Run On	0x003C
Lumen Maintenance Factor	0x003D

Property Name	Property ID
Luminous Efficacy	0x003E
Luminous Energy Since Turn On	0x003F
Luminous Exposure	0x0040
Luminous Flux Range	0x0041
Motion Sensed	0x0042
Motion Threshold	0x0043
Open Circuit Event Statistics	0x0044
Outdoor Statistical Values	0x0045
Output Current Range	0x0046
Output Current Statistics	0x0047
Output Ripple Voltage Specification	0x0048
Output Voltage Range	0x0049
Output Voltage Statistics	0x004A
Over Output Ripple Voltage Event Statistics	0x004B
People Count	0x004C
Presence Detected	0x004D
Present Ambient Light Level	0x004E
Present Ambient Temperature	0x004F
Present CIE 1931 Chromaticity Coordinates	0x0050
Present Correlated Color Temperature	0x0051
Present Device Input Power	0x0052
Present Device Operating Efficiency	0x0053
Present Device Operating Temperature	0x0054
Present Illuminance	0x0055
Present Indoor Ambient Temperature	0x0056
Present Input Current	0x0057
Present Input Ripple Voltage	0x0058
Present Input Voltage	0x0059
Present Luminous Flux	0x005A
Present Outdoor Ambient Temperature	0x005B
Present Output Current	0x005C

Property Name	Property ID
Present Output Voltage	0x005D
Present Planckian Distance	0x005E
Present Relative Output Ripple Voltage	0x005F
Relative Device Energy Use In A Period Of Day	0x0060
Relative Device Runtime In A Generic Level Range	0x0061
Relative Exposure Time In An Illuminance Range	0x0062
Relative Runtime In A Correlated Color Temperature Range	0x0063
Relative Runtime In A Device Operating Temperature Range	0x0064
Relative Runtime In An Input Current Range	0x0065
Relative Runtime In An Input Voltage Range	0x0066
Short Circuit Event Statistics	0x0067
Time Since Motion Sensed	0x0068
Time Since Presence Detected	0x0069
Total Device Energy Use	0x006A
Total Device Off On Cycles	0x006B
Total Device Power On Cycles	0x006C
Total Device Power On Time	0x006D
Total Device Runtime	0x006E
Total Light Exposure Time	0x006F
Total Luminous Energy	0x0070

Table 4.4: Property identifiers by property name

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