Thomas Research Products

Background Information

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Electrical Terminology

Alternating Current (AC) - a flow of electrons which reverses its direction of flow at regular intervals in a conductor. High voltage AC provides a more efficient way of transmitting power over long distances than low voltage DC.

Ambient Temperature - The temperature of the surrounding medium, such as gas, air or liquid, which comes into contact with a particular component. Typically, the temperature of the air around a components or luminaire.

AMMETER - An instrument for measuring the flow of electrical current in amperes. Ammeters are always connected in series with the circuit to be tested.

Ampere - A unit of measure for the flow of current in a circuit. One ampere is the amount of current flow provided when one volt of electrical pressure is applied against one ohm of resistance. The ampere is used to measure electricity much as "gallons per minute" is used to measure water flow.

Ampere-Hour - A unit of measure for battery capacity. It is obtained by multiplying the current (in amperes) by the time (in hours) during which current flows. For example, a battery which provides 5 amperes for 20 hours is said to deliver 100 ampere - hours.

Astronomical clock - A timer control scheme that adjusts ON, OFF and dimming levels based on local time adjusted for seasonal sun-rise and sun-down times.

Auxiliary Output - The AUX port is a secondary port or set of leads used to communicate data or power from one source to a controller.

BLE - Bluetooth Low Energy is the power- version of Bluetooth that was built for the Internet of Things (IoT).

Capacitor- a device which stores electrical energy in the form of electrical charges. Commonly used for filtering out voltage spikes.

Charge - To restore the active materials in a storage battery by the passage of direct current through the battery cells in a direction opposite that of the discharging current. This allows energy to be stored in the device.

Class 2 - In general, a Class 2 circuit (operating at 24V with a power supply durably marked "Class 2" and not exceeding 100VA) is the type most commonly used. The NEC defines a Class 2 circuit as that portion of the wiring system between the load side of a Class 2 power source and the connected equipment. Per UL, for DC applications (LED drivers) the limits are 100VA, 5.0A, 60V.

Class P - A UL certification for fluorescent ballasts and LED drivers. The devices will be inherently safe from specific electrical hazards and thermal runaway. These are "UL Listed" devices that will shorten the safety certification review process for use in luminaires.

Constant Current Output - A constant current power supply varies the voltage across an electronic circuit allowing the device to maintain a constant electric current. This type of circuit is preferred for LED power supplies to ensure that, no matter the variation in voltage, the current delivered to LEDs does not change. Any change in LED current will result in a change in light output.

Constant Voltage Output - When strings of LEDs are connected in parallel; there may be an issue in terms of trying to match the current in all the strings. Thus, an external constant-voltage driver is required. Constant voltage led power supplies are, consequently, most often used for signs for which it is not known, prior to their installation, how many LED loads there will be.

Cradle - An accessory item used to hold a device to be programmed. TRP compact LED drivers ae programmed with a cradle and GUI (Graphical User Interface) software.

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Crest Factor - The ratio between the peak value and the RMS value expressed as a factor. For a pure sinewave this is 1.414. It is not intended to indicate the purity of a waveform but is intended to indicate the maximum voltage or current that is being endured within the cycle. For interest; The crest factor of a pure triangular wave is 1.732, and a pure square wave is 1.0

CSA - Canadian Standards Association. CSA Group is an independent, not-for-profit member- based association dedicated to advancing safety, sustainability and social good. It is an internationally-accredited standards development and testing & certification organization. It has a broad range of knowledge and expertise includes: industrial equipment, plumbing & construction, electro-medical & healthcare, appliances & gas, alternative energy, lighting and sustainability. The CSA mark appears on billions of products around the world.

Current - Movement of electricity along a conductor. Current is measured in amperes.

Constant Current Reduction - (CCR) the process of transitioning high current to a specific lower level by reducing the DC output level. No significant AC waveform component is involved.

Cycle - The duration of one complete sine wave, typically measured from peak to peak. One 60Hz cycle = 0.016 seconds.

Cycling - The process in which a device is repeatedly taken from one mode to another. For a battery, this is involves discharging and recharging. For a switch or control relay, this may involve turning the device ON and OFF.

DALI - DALI control system is a complete building-wide digital lighting control system built on the DALI, Digital Addressable Lighting Interface and Ethernet international standards. The system consists of Line Controllers linked on an Ethernet network so you can scale your lighting system from a room, to a floor, to a building and beyond. Each Line Controller uses time schedules, push-buttons, switches and sensors to control lighting and emergency lights on DALI Lines.

Damp Location - An exterior or interior location that is normally or periodically subject to high moisture content (relative humidity) in, on or adjacent to the electrical components of a lighting fixture or ceiling fan.

Daylight Sensor - A daylight sensor is a passive device that converts "light energy" whether visible or in the infra-red parts of the spectrum into an electrical signal output. Daylight sensors are more commonly known as "Photoelectric Devices" or "Photo Sensors" because the convert light energy (photons) into electricity (electrons).

DC Component - Generally, a steady state current portion of a waveform. It is possible to feed AC waveforms on top of a DC carrier hence resulting in a DC voltage being measured (after filtering out the AC) on the line. However, wave imbalance can also create an apparent DC component. This is as a result of the mean of the positive portion of the wave being different from the mean of the negative portion.

Dim to Off - A lighting control feature used to reduce light levels from full output or dimmed state to a full dim which turns off the LED being controlled. In this "Off" state, a small power consumption keeps part of the driver's internal control circuit "On" in order to react to signal from a dimmer or other control device. The main output power to the LED load is off in this state and consumes no power. Also referred to by "Dim to Zero" or "Dim to Dark".

Diode - An electrical device that will allow current to pass through itself in one direction only. Also see "Zener diode."

Direct Current (DC) - A steady flow of electrons moving steadily and continually in the same direction along a conductor from a point of high potential to one of lower potential. It is produced by a battery, generator, or rectifier.

Discharge - To remove electrical energy from a charged body such as a capacitor or battery.

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Displacement Power Factor - DPF, also known as Fundamental Power Factor, is used to measure the voltage-current phase relationship of a load whose current is drawn as a linear load (i.e. as a sine wave) or the fundamental (i.e. the 50/60Hz) component of a complex load. If the load were to be purely inductive (e.g. motor or transformer) or capacitive, then the DPF and PF would be identical. As DPF does not include harmonic content it can be vastly different to the true PF, especially in loads which are mainly hi-tech. However, DPF will always contribute to the true PF.

Distortion - The degree by which the waveform is misshapen with respect to what is desired, this figure usually quoted in percent. Distortion, however, is not a word heard very often in Power Quality. It is more common to single out the various aspects that cause or describe the distortion of the waveform.

DMX - A standard for digital communication networks that are commonly used to control stage lighting and effects. It was originally intended as a standardized method for controlling light dimmers, which, prior to DMX512, had employed various incompatible proprietary protocols

Dry Location - An exterior or interior location that is not subject to condensation of moisture in, on or adjacent to the electrical components of a lighting fixture or ceiling fan.

Efficiency - A value detailing the quality of energy usage in a specific circuit.

Electrical Field - The region around a charged body in which the charge has an effect.

Electricity - The flow of electrons from atom to atom in a conductor.

Emergency Driver - An LED driver consisting of typical LED driver technology, which includes batteries or other energy storage design to activate whenever there is a loss of main power. In theory; there is an internal relay that switches between battery or AC power.

EMI - Electromagnetic interference (EMI), also called radio-frequency interference (RFI) when in the radio frequency spectrum, is a disturbance generated by an external source that affects an electrical circuit by electromagnetic induction, electrostatic coupling, or conduction.

FCC - The Federal Communications Commission regulates interstate and international communications by radio, television, wire, satellite, and cable in all 50 states, the District of Columbia and U.S. territories. An independent U.S. government agency overseen by Congress, the commission is the United States' primary authority for communications laws, regulation and technological innovation.

Field Effect Transistor (FET) - A transistor that uses an electric field to control the flow of current. Connections are the source (input), drain (output) and gate (control).

Fixed Output Driver - A single constant current or voltage output LED driver. Cannot change full output level.

Fixed Resistor - A resistor which has only one resistance value. When programming a driver through RSET port; a fixed resistor is typically used to set a specific output current

Flicker - The perceived or real change in brilliance of lighting as a direct result of sudden changes in incoming voltage. This is usually expressed in Perception Units (Pu). A level of 1Pu is where flicker becomes annoying, or worse still can induce epileptic fits in those who suffer the condition. The section on "Flicker" expands on this.

Form Factor - As an electrical term, this is the older version of crest factor but in this case is the difference between the peak value and the average value of a waveform. It was used when instruments were not capable of measuring true RMS and one had to rely on average and peak readings.

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Frequency - The number of pulse or wave cycles that are completed in one second. Frequency is measured in Hertz, as in 60Hz (Hertz) per second.

Fuse - A replaceable safety device for an electrical circuit. A fuse consists of a fine wire or a thin metal strip encased in glass or some fire-resistant material. When an overload occurs in the circuit, the wire or metal strip melts, breaking the circuit

Ground - or earth ground is the reference point in an electrical circuit from which voltages are measured, a common return path for electric current, or a direct physical connection to the Earth.

GUI - Graphical User Interface used by computer software and applications to set parameters for electrical devices.

Harmonics - Direct multiples of the main frequency e.g. 120Hz, 180Hz, etc., on a 60Hz system. Harmonics are referred to as 'even' or 'odd'. The next harmonic is considered the 2nd harmonic at 120Hz=2x 60Hz (even), and the third at 180Hz=3x 60Hz (odd), The harmonic multiplication factor is the number of the harmonic referred to. The third harmonic (180Hz) is particularly troublesome in 3 phase systems. At 33% content of the 3rd harmonic current in 3 phases, the neutral will must then carry 99% of full rated current.

HRC - High Rupturing Capacity/Current - A characteristic defining a protection device will withstand a large fault current (usually specified in amps). It does not define how the device will operate, merely that it will do so safely when it operates (up to the fault current, if specified).

Inrush - The current demanded by a load when first applied to the power. Inrush is expressed in absolute current, preferably peak current but often as RMS (as it usually appears less demanding). This event usually lasts for less than 1 millisecond.

Inductance - The property of an electric circuit by which an electromotive force (voltage) is induced in it by a variation of current either in the circuit itself or in a neighboring circuit.

Inductor - A coil of wire wrapped around an iron core. This device stores energy in the form of a magnetic field.

Insulator - A substance or body that resists the flow of electrical current through it. Also see "Conductor:'

Integrated Circuit (IC) - An electronic circuit which utilizes resistors, capacitors, diodes, and transistors to perform various types of operations. The two major types are Analog and Digital Integrated Circuits. Also see "Analog IC" and "Digital IC."

Inverter - A power inverter, is an electronic device or circuitry that changes direct current (DC) to alternating current (AC)

IP Rating - IP (or "Ingress Protection") ratings are defined in international standard EN 60529 (British BS EN 60529:1992, European IEC 60509:1989). They are used to define levels of sealing effectiveness of electrical enclosures against intrusion from foreign bodies (tools, dirt etc.) and moisture. The numbers that follow IP each have a specific meaning. The first indicates the degree of protection (of people) from moving parts, as well as the protection of enclosed equipment from foreign bodies. The second defines the protection level that the enclosure enjoys from various forms of moisture (drips, sprays, submersion etc.)

Isolated Output - Isolated generally refers to having a physical separation from one side to the other. E.g. The AC side is Isolated from the DC side on a circuit. Some LED drivers have a 0-10V isolated dimming; that is there is no connection between the dimming leads and the output or input leads.

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Kilo Watts - With one watt equaling one Joule/second, this is the measurement of Real or True Power dissipated in an electrical circuit A Kilo-Watt = 1000 Watts. i.e.
When dealing with DC; the unit for power can be express in Watts (W). When dealing with AC; the units typically used are express in VA in a direct current system or for resistive loads, the wattage (W) and apparent power (VA) measurements will be identical. But for reactive loads, the voltage and current are out of phase.

KVA: Kilo Volt-Ampere - A volt-ampere (VA) is the voltage times the current (power) feeding an electrical load. A kilovolt-ampere (kVA) is 1000 volt-amperes. VA is the product of the RMS values of voltage and current i.e. apparent power. It is not a measure of true power but, a convenient means to indicate the capacity of a source or the demand of a load on that source.

Leading Edge Dimmer (Incandescent) - Standard phase control dimmers for use with magnetic low-voltage transformers use a technology known as standard phase control or "leading edge." The leading edge of the waveform is removed to reduce waveform energy and achieve dimmed output levels.

Leakage current - The current that originates from but does not return to the source on the primary current carrying conductors (i.e. Live(s) and Neutral). Such return usually occurs via the Protective Earth or Ground and is primarily due to capacitance between the current carrying conductors and Earth/Ground (e.g. filter components).

Light Emitting Diode (LED) - A solid - state display device that emits infrared light when a forward - biased current flows through it.

LOC: Lumen Output Compensation - A lighting control strategy that increases light source power over time to maintain constant light output as the source ages. All light sources decrease output to varying degrees over time.

Lumen Maintenance - in LED lighting, lumen maintenance is the luminous flux remaining (expressed as a percentage of the initial output) at any selected elapsed operating time.

Milliampere - 1/1,OOO ampere.

Multimeter - A testing device that can be set to read ohms (resistance), voltage (force), or amperes (current) of a circuit. For accurate measurements, a "True RMS" meter should be used to capture the correct average of a waveform that may not have an ideal shape (perfect sinewave).

Negative - Designating or pertaining to a kind of electricity. Specifically, an atom that gains negative electrons is negatively charged.

Network - In full this would be referred to as the 'electricity supply network' and comprises all of the components from generation to wall sockets, including all distribution, transformer, and cable systems in between. A network may also be a connected set of devices used for communication to and control over a large number of devices such as luminaires.

NFC - Near Field Communication (NFC) is a standards-based short-range wireless connectivity technology that makes programming programmable LED drivers. Typically a hand-held wand type of device.

Non-Class 2 - A Class 2 circuit (operating at 24V with a power supply durably marked "Class 2" and not exceeding 100VA) is the type most commonly used. When circuits are outside of this parameter, they are not Class 2. Per UL, for DC applications (LED drivers) the limits are 100VA, 5.0A, 60V. Anything over, would be NON-Class 2.

OHM - The standard unit for measuring resistance to flow of an electrical current. Every electrical conductor offers resistance to the flow of current, just as a tube through which water flows offers resistance to the current of water. One ohm is the amount of resistance that limits current flow to one ampere in a circuit with one volt of electrical pressure."

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Ohmmeter - An instrument for measuring the resistance in ohms of an electrical circuit.

Open Circuit - An open circuit occurs when a circuit is broken, such as by a broken wire or open switch, interrupting the flow of current through the circuit. It is analogous to a closed valve in a water system.

Parallel Circuit - A circuit in which the circuit components are arranged in branches so that there is a separate path to each unit along which electrical current can flow.

PIR Sensor Passive Infrared sensor - A passive infrared (PIR) sensor measures infrared light emitted from objects that generate heat, and therefore infrared radiation, in its field of view. Crystalline material at the center of a rectangle on the face of the sensor detects the infrared radiation.

POC Programmable Output Current - When a specific output current is required for an LED light engine, using a programmable LED driver accomplishes this. That is, the output current of an LED driver can be programmed within its specifications.

Polarity - A collective term applied to the positive (+) and negative (-) ends of a magnet or electrical device such as a coil or battery.

Positive - Designating or pertaining to a higher potential voltage. An atom which loses negative electrons and is positively charged.

Potentiometer - A variable resistor; often used as a voltage divider.

Power Factor - The apparent power vs the true power consumed by a load expressed as a factor and can be calculated as the Cosine of the angle of current lead or lag relative to the voltage waveform. Although Cosine can never be negative a minus sign is used to depict a lagging current (inductive load) and plus (or no sign) indicating a leading current (capacitive load). High power factors are preferred in that such circuits use less current. This may be expressed as a percent or decimal (0.90 or 90% power factor).

Printed Circuit Board (PCB) - A device used to hold integrated circuit components in place and provide current paths from component to component. Copper pathways are etched into the board with acid.

Programmable Driver - When a specific output current is required for an LED circuit, using a programmable LED driver accomplishes this. Programming process is either through an accessory device linked to a GUI (Graphical User Interface) to set the parameters, or through an NFC (Near Field Communication) device.

PU (Per Unit) - A term used so often by electrical engineers it was incorporated into IEEE "definitions"! This must not be confused with Pu being Perception Units whose 'u' is lower case. PU is the result of dividing the actual voltage by the nominal regardless of the voltage itself. Example: A sag to 0.94PU on a 230V feed would be a sag to 216V with a swell to 1.1PU being 253V. This same sag or swell could be on the 11kV feeder into a suburb and the figures would therefore be 10.34kV and 12.1kV respectively. It is up to the engineer whether this may be a fixed or sliding nominal (sliding being where if a slow change occurs over an extended period then the new value is the nominal), but fixed is the usual.

Pu (Perception Units) - Also known as Units of Perception and is mostly used to relate the severity of flicker experienced, but can be used to determine any annoyances resulting from bad power (although there appears to only be one standard, this being flicker). The section on "Flicker" shows this.

Pulse - A signal, with a very short duration, that is produced by a sudden ON and OFF of direct current (DC) within a circuit.

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PWM Dimming Pulse Width Modulation - Analog dimming changes LED light output by simply adjusting the DC current in the string, while PWM dimming achieves the same effect by varying the duty cycle of a constant current in the string to effectively change the average current in the string. The signal is all on or all off for a period of time (duty cycle) and has a frequency associated with it. So a signal that is on for half the time and off for the other half of a full cycle, will produce an average signal level of 50% output.

Relay - An electrical coil switch that uses a small current to control a much larger current.

Resistance - The opposing or retarding force offered by a circuit or component of a circuit to the passage of electrical current through it. Resistance is measured in ohms

RF - Radio frequency (RF) is any of the electromagnetic wave frequencies that lie in the range extending from around 3 kHz to 300 GHz. RF usually refers to electrical rather than mechanical oscillations.

RHEOSTAT - A resistor used for regulating a current by means of variable resistance; rheostats allow only one current path.

Ripple Current - Ripple current is an AC current component in the output of a power supply that is fed rectified AC, or pulsed DC. Ripple current can be represented by a sinewave riding atop of the DC line. When the driver has a small ripple current (typically <5%) is said to be flicker free.

RMS - The Root of the Mean of the Squares (usually shortened to Root Mean Square) - The equivalent DC value of an AC waveform. An example would be the equivalent DC voltage that would cause a lamp to shine at the same brilliance as the applied AC voltage. This value is the square root of the mean (average) of the squared values of points along the curve of the waveform. For a sine wave the result is 0.70717 and (for interest) a triangle wave is 0.645 and a square wave is 1.0. A "True RMS" multi-meter should be used to accurately take measurements of AC voltages mathematically account for the waveform distortions.

Schedule Dimmer - Controlling the dimming function of a device based upon a specific schedule and time of day.

Semiconductor - An element which has electrons in the outer ring of the atom that are easily displaced. This allows for doping which creates an excess (negative) or decreased (positive) number of electrons affecting overall charge. Silicon and germanium are examples. These elements are neither good conductors nor good insulators. Semiconductors are used to make diodes, transistors, and integrated circuits.

Sensor - an electronic component, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other devices.

Series Circuit - A circuit in which the parts are connected end to end, positive pole to negative pole, so that only one path is provided for current flow.

Series-Parallel Circuit - A circuit in which some of the circuit components are connected in series and others are connected in parallel.

Short Circuit - This occurs when one part of a circuit comes in contact with another part of the same circuit, diverting the flow of current from its desired path.

Shunt - A conductor joining two points in a circuit so as to form a parallel circuit through which a portion of the current may pass. A shunt is usually low resistance and may be calibrated to measure current flow.

Solenoid - A tubular coil used for producing a magnetic field. A solenoid usually performs some type of mechanical work.

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Solid-State Circuits - Electronic (integrated) circuits which utilize semiconductor devices such as transistors, diodes and silicon controlled rectifiers.

Sound Rating - General rating levels originally used when defining sounds created by electromagnetic ballasts. These levels are now used generically for LED drivers with letters designated to ranges of acoustic power.

A - For installations such as private offices, recording studios, study halls, libraries, etc. (where the ambient sound level is 20 to 24 decibels)

B - For offices, residential use, etc. (where the ambient sound level is 25 to 30 decibels)

C - For large office areas, commercial use, stores, etc. (where the ambient sound level is31 to36 decibels)

D - For manufacturing facilities, large stores, offices with much equipment in use (where the ambient sound level is 37 to 42 decibels)"

Spike - The exceptionally sharp deviation from and then return to normal (total disturbance <50µs) of the main waveform, usually experienced during lighting strikes, and can be up to many times the peak voltage of the main waveform. They have; however, such a high frequency component that transformers, power supply filters and even long and cumbersome wiring will minimize the effects. Spikes are usually non-consequential disturbances.

SURGE/SWELL/SAG/DIP - A rise (surge or swell) or fall (sag or dip) in voltage for a period of a half-cycle or longer. Usually the waveform, although different in magnitude, is not drastically distorted. The word 'surge' is an emotive one and has, through this, been erroneously used to describe a damaging transient. It is accepted, in layman situations only, to use the term 'surge' to refer to a significant increase in the RMS voltage owing to a large impulse.

SURGE PROTECTION DEVICE (SPD) - A component that protects electrical circuits from high voltage transients. Typically metal oxide varistors (MOV) are used in SPDs. MOVs protect by allowing a high current path that inherently clamps down on the high voltage spikes that may exist between line, neutral and ground terminals.

THC Total Harmonic Current - This is the accumulated currents that contribute to the distortion of the current waveform. It is effectively the portion of the calculation that will be used to calculate the Current THD (the part before dividing by the relative i.e. fundamental, RMS, etc.). This value is particularly useful in determining the required characteristics for installation of modern active harmonic filters.

Thermal Protection - A means of controlling the function of a product in high or low temperatures

Thermistor - A temperature - compensated resistor. The degree of its resistance varies with the temperature. In some regulators, it controls a Zener diode so that a higher system voltage is produced in cold weather, when needed.

Trailing Edge Dimmer - Dimmers for electronic low voltage transformers use reverse phase control or "trailing edge." The Trailing edge of the waveform is removed to reduce waveform energy and achieve dimmed output levels.

Transformer - A device made of two coil windings that transfers voltage from one coil to the next through electromagnetic induction. Depending upon the number of windings per coil, a transformer can be designed to step-up or step-down its output voltage from its input voltage. Transformers can only function with alternating current (AC).

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Transient - A relatively short-term, overpowering disturbance superimposed on a waveform that returns to normal within a maximum of a half-cycle. Transients, owing to their duration and magnitude, are consequential disturbances i.e. there is likely to be equipment damage.

Transient Voltage Protection Module (TVP) - A device which protects the engine controller electronics against high energy voltage transients such as alternator load dumps.

Transistor - A device constructed of semi-conductors that is used in circuits to control a larger current by using a smaller current for operation. Its function is the same as a relay.

Type HL - UL established a new "Type HL" designation for LED drivers, patterned after the requirements for Type HL ballasts. These requirements for LED drivers were issued as a Certification Requirement Decision (CRD) to the standard UL 8750, "Light Emitting Diode Equipment for Use in Lighting Products". LED Drivers with the "Type HL" marking can be used in end product luminaires intended to be installed in hazardous (classified) locations areas, without further evaluation. Type HL drivers will be Listed or Recognized, as appropriate, in their regular ordinary location product category. Please visit www.ul.com/standards, for text of the new requirements

UL - As a recognized agency for safety, UL has two main sections that overlap. There is the certification agency that certifies, validates tests, verifies, inspects, audits, advises and educates customers in numerous industries on their products. The standards od safety section creates and maintains the safety regulations that devices are tested to.

UL Classified - UL Classification means that UL has tested and approved samples of your product with respect to certain properties of the product for specific applications.

UL Listed - UL listing means that UL has tested representative samples of the product and determined that it meets UL's requirements. These requirements are based primarily on UL's published and nationally recognized Standards for Safety.

UL Recognized - UL's component recognition service covers the evaluation of components or materials intended for use in a complete product or system. These components are intended only for incorporation into other end-use products that may be eligible for UL's Listing, Classification or Certificate Service.

USB - short for Universal Serial Bus, is an industry standard initially developed in the mid-1990s. USB was designed to standardize the connection of computer peripherals (including keyboards, pointing devices, digital cameras, printers, portable media players, disk drives and network adapters) to personal computers, both to communicate and to supply electric power. It has become commonplace on other devices, such as smartphones, PDAs and video game
consoles. USB has effectively replaced a variety of earlier interfaces, such as parallel ports, as well as separate power chargers for portable devices

Variable Resistor - A resistor that can be adjusted to different ranges of value. E.g. varistors and Potentiometers

Volt - A unit of electrical pressure (or electromotive force) which causes current to flow in a circuit. One volt is the amount of pressure required to cause one ampere of current to flow against one ohm of resistance.

Voltage - That force which is generated to cause current to flow in an electrical circuit. It is also referred to as electromotive force or electrical potential. Voltage is measured in volts.

Voltage Regulator - A device that controls the strength of a magnetic field produced by a generator or alternator. Typically used to maintain a desired output voltage.

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Voltmeter - An instrument for measuring the force in volts of an electrical current. This is the difference of potential (voltage) between different points in an electrical circuit. Voltmeters are connected across (parallel to) the points where voltage is to be measured.

Watt - A unit of measure for indicating the electrical power applied in a circuit. It is obtained by multiplying the current (in amperes) by the electrical pressure (in volts) which causes it to flow. That is: watts = amperes x volts.

Watt-Hour - A unit of electrical energy. It indicates the amount of work done in an hour by a circuit at a steady rate of one watt. That is, watthours = ampere - hours x volts.

Wave Imbalance - When the shape of the waveform differs between the positive and negative portions.

Wet Location - "Suitable for Wet Locations" can be used in wet locations. A wet location is an location in which water or other liquids may drip, splash or flow on or against the electrical components of a lighting fixture or ceiling fan. For safety certifications, indoor and outdoor locations must be handled separately. Outdoor locations have different material and testing requirements.

Wi-Fi - is a technology for wireless local area networking with devices based on the IEEE 802.11 standards.

0-10V - is an analog lighting control protocol. Basically, a 0-10V control applies a voltage between 0 and 10 volts DC to produce a varying intensity level. For LED drivers, the driver's port provides a Voltage between 0-10 Vdc and a small current <2mA. A current sink controller is often used in 0-10V dimming applications.