Company Profile

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Company Introduction
About Us

VaOpto is a 100% USA Owned company specializing in the manufacturing, research and development, design and wholesale of LED products. We are a vertically-integrated company, focusing only on LED products, such as LED components, chips, packages, light engines and full luminaires. We stock many of our products at our headquarters in Las Vegas, Nevada. We are an Energy Star SSL Partner, American Lighting Association member, Illuminating Engineering Society Silver sustaining member, as well as DesignLights Consortium listed. Our breadth is wide; we are an approved vendor to many Fortune 500 companies.

We are currently working with top-level distributors, such as: WESCO, Graybar, Future Electronics, CED, CES and WPG Americas. With over 100 sales representatives and distributors we are able service all major markets and smaller markets across the United States. Our markets include commercial, industrial, residential and custom products. We are currently expanding our business in government and municipal projects, retail chain stores, property management companies, OEM and ODM. With 35% growth from 2005-2014 we are staged for continued accelerated growth and expansion of our markets.
Corporate Profile

DUNS #: 02-865-5610
YEAR OF ESTABLISHMENT: 2005
CORPORATION TYPE: Limited Liability Corporation
PRESIDENT: Charles Li
OWNERSHIP AND STATUS: 100% American Citizen Owned with Certified Minority Business Enterprise
CAGE CODE: 6ZV72

NAICS CODES:
334413 LED (light-emitting diode) Manufacturing
335110 Electric Lamp Bulb and Part Manufacturing
335121 Residential Electric Lighting Fixture Manufacturing
335122 Commercial, Industrial, and Industrial Electric Lighting Fixture Manufacturing
335129 Other Lighting Equipment Manufacturing

SIC CODES:
3641 Electric Lamps
36423645 Residential Lighting Fixtures
36433646 Commercial Lighting Fixtures
36443648 Lighting Equipment, Nec

REGISTRATIONS
SAM (System for Award Management)
CVM Solutions
Manufacturing Facility

World-class LED manufacturing facility
LOCATION: Guangdong, Mainland China
ESTABLISHED: 1969
SIZE: 2 Million Square Feet
EMPLOYEES: 3,000
ENGINEERS in R&D CENTER: 200
PRODUCTION: 200 million products manufactured daily
PRODUCES: LED Products in LED die, packaged LED, LED Engine, LED light fixture, and LED luminaire
CERTIFICATIONS: ISO14001, ISO9001, TS16949, OHSAS18000
Patents and Certificates

CURRENT PATENTS:
LED Monster Reading Lamp: US D608937, CANADA 131905
LED Turtle Reading Lamp: US D608936, CANADA D131904
LED Strips: US 8262250, US 61/079042, CANADA 671360
LED Spotlight: US 7972040, CANADA 2676315
LED Lamp Assembly: US 13/110457, US 61/091072
LED White Light: US 12/370685, CANADA 2656314
LED Light Source Module: US 12/473468, CANADA 2675193
LED Strip Lighting Connector: US 13/106558, US 12/975445, CANADA 2740387
LED Module: US 12/975445, CANADA 2726179

cULus Approved Certificates:
LED Spotlight, Post Top, BR, A19: cULus E324837
LED Flex Strips, Hard Strip, Shelf Light: cULus E321933; cULus E355338
LED T8, Down Light: cULus E335470
LED Reading Light: cULus E329183
LED High Bay Light, Street Light, Flood Light, Fixture: cULus E335469
LED Module: cULus E301137
LED Emergency Lighting: UL E361994
LED Troffer Fixture: E362951
LED Power Supply: cULus E324838

cETLus Approved Certificates
LED T5: cETLus GZ10040056-1

Energy Star Approved Certificates
LED Bulb
LED BR
LED Down Light

DLC Approved Certificates
LED T8
LED High Bay
Membership, Partnership & Awards

PARTNERSHIPS:
Energy Star SSL Partner
DLC Product Partner

MEMBERSHIPS:
American Lighting Association: Steering Committee Member
Illuminating Engineering Society: Silver Member
ISA
NEMRA
NMSCD

AWARDS:
2010 LED Show: Best Energy Saving Concept – T8 Retrofit
2011 State of Nevada Development Authority Entrepreneurship and Success
Smart Lighting
Multi-Dimension Human Detection

When people come in the morning, lights gradually dim up. Step into elevator, lights automatically turn on. High tech experience while saving energy.
Sunlight like, Healthy
Change color temperature to simulate sun light pattern, produce natural feel
Smart Lighting

Functionalities

Conference room Scenes
Conference room scenes for slides, chatting etc, one press to switch
Smart Lighting

Functionalities

Designed Scenes
Scenes designed by designer, adding another dimension to the whole room design
**Smart Lighting Technology**

Wireless smart lights, dim/color temperature/color control.

Sensors, including brightness, temperature, humidity, motion, image etc. Provides control & env data

Gateway: bridge device network to cloud, as well as A/C control & building management system

Cloud service collect & analyze data from building to give insights and to optimize control
Smart Lighting

System Structure

Cloud Service
- energy saving
- Learning

User Data
Operation Data

Internet

Local Network

Gateway
- LED
- Switch
- Sensor
- Controller
- Smart Plug

Remote Monitoring

Smart Terminal

Smart Terminal
Smart Lighting

Wired VS Wireless

Wired System

Four wires for each device, plus bus. High complexity during installation, takes long time, hard to make change afterwards.

High cost & complexity, not suitable for large buildings

Wireless System

No extra work on wiring and installation, no electricity design needed. Smart system installation very fast, no different from regular installation.

Low cost, easy installation
Smart Lighting

Multiple Ways to Control

**Fully Automatic**
Control based on sensors, completely automatic, maximize energy saving

**Manual**
Control panel, remote controller are available for easy manual control

**Schedule**
Schedules to change control strategy for each time slot.
Smart Lighting

**Smart Lighting Products**

- T8 Tube
- Wall Pack
- Panel Light
- Canopy
- Light Bulb
- Spot light

- Gateway
- Controller
- Sunlight Sensor
- Motion Sensor
- Infrared Sensor
- Smart Plug
Smart Lighting

Applications

Warehouse lighting

Sensors installed on isles, turn on when people come, turn off when people left
Smart Lighting

Applications

VIP, Amazon, JD Warehouse

Four Level Control: HQ → Regional → Single Warehouse → Gateway,
Separate authorization for each level
Each isle can be controlled separately
Robust wireless protocol
Remote monitoring

VIP: 9470 nodes, 2.4Mil sqft, save 88.74%, money save US$570K/year
JD: 2790 nodes, 900K sqft, save 84.37%, money save US$100K/year
Amazon Beijing: 970 nodes, 67K sqft, save 93.67%; money save US$80K/year
Smart Lighting

Applications

Factory Lighting

Control by zones, max saving, central control, easy to use
GreateWall Car Factory

120K sqrft, 33 independent sections, old wall switch control can only turn on/off together

Installed VaOpto Smart Lighting, save 52% usage, US$12K/year; 33 sections can be controlled independently.

Remote control through cloud on every light. Schedule / delay built in lights.
Smart Lighting

Applications

School Lighting
Sensor to guarantee enough lights, protect vision health, auto off when empty, save money and easy to use
Smart Lighting

Applications

Museum Lighting
No need to change lights for new shows, adjust color/temperature/dimming level for perfect effect, save cost and time.
Hospital Lighting

Adjust lighting for patients’ health, public area use sensor-base lighting to save energy
Smart Lighting

Applications

Hotel Lighting

Scenes in hotel rooms, Ball rooms adjustable for different occasions, Lobby lighting change for weather/season/holidays
Smart Building
Energy Saving Potentials

Commercial Buildings: Huge Energy Saving Potentials

Energy Saving Potentials
E3 System focus on Lighting & A/C, to save energy on the two biggest sections.

- Warehouse: -90%
- Factory: -65%
- Office: -47%
- Street: -38%
- Store: -30%

Smart Building

Pie Chart:
- Lighting: 20%
- HVAC: 45%
- Other: 35%
- Heating: 27%
- A/C: 18%

Savings Chart:
A/C

An office building in Beijing. With windows open in all day Winter & Summer

Warehouse

Most warehouses keep lights on for all isles
Smart Building

Commercial Air Conditioning Solution

- Two-way communication: solved issues by infrared control
- Data collection: combine A/C, sensors & weather data to optimize,
- Temperature field control: solve individual temperature detection problem
VaOpto Smart Green Building helps save more than 50% on lighting, and 30% on air conditioning. Give the building a “brain” other than saving energy.
Smart Home
Smart Home – Intelligent Villa Solution

First floor sample
Smart Home – Intelligent Villa Solution

Second floor sample
Outdoor extension

Perimeter defense system

Garage control system

Automatic irrigation system
Smart Home – Intelligent Three Bedroom Solution

Three bedroom
Smart Home – Intelligent Two Bedroom Solution

Two bedroom
Smart Home – System Introduction

- Intelligent Central Control
- Lighting Management
- Air conditioning Management
- Curtain Management
- Time Management
- Motion Sensor
- Security System
- Multi-media Control
Smart Home – System Introduction

- Water pressure monitoring system
- Electric power monitoring system
- Fresh air system
- Elevator control system
- Air quality monitoring system
- Sliding window system
- Automatic air drying system
Smart City
Smart City – Intelligent Road Lighting

Sensor selection & its composition
Low cost & rapid network access
Smart City – Management System

Simple, modular, flexible and intelligent.

**Intelligence at cabinet level**
- Wireless communication and intelligent streetlight network
- Cabinet-level metering and control
- Astronomical clock and ambient light detection
- Power quality monitoring and fault detection
- Cabinet and cable antitheft

**Intelligence at lamp level**
- Power line communication and seamless data transmission
- Individual luminaire on/off and dimming
- Automatic fault detection for each luminaire
- Energy consumption per luminaire
- Bulb status and burn hours detection
- Lamp antitheft
An installation based on the Module System consists of a number of components working seamlessly together to achieve the desired functionality. This modular flexibility makes the system scalable in the future and allows for easy expansion of functionalities if necessary. When new components are installed, they are automatically discovered and will establish communication with the rest of the system, and a host of new functionalities will be ready for configuration in the server.

- A, Manual switch
- B, Concentrator
- C, I/O Module
- D, Switch
- E, Current
- F, Backup Battery
- G, Power meter
- H, Circuit contactor
- I, Circuit breaker
- J, Main breaker
- K, Incoming power
The concentrator is the central processing unit in the Module System. Equipped with a powerful ARM9 processor and a Linux kernel, the module monitors and controls all other modules in the Module System.

**Network and Device Interfaces**
- IP via built-in 10/100BaseT Ethernet interface
- Built-in PLC transceiver.
- Built-in GSM GPRS (or CDMA) modem.
- Modbus RTU with built-in RS-485 transceiver.
- Modbus TCP (Modbus TCP/IP) with built-in Ethernet interface
- Custom drivers using built-in Ethernet, USB, RS-232, and RS-485 interfaces.

The concentrator serves as a WAN communications and data concentrator module. Data are either delivered to the server immediately or stored locally in the built-in flash memory of the concentrator until scheduled delivery. Software and configurations are updated remotely from the server and stored on the concentrator enabling it to autonomously execute tasks, e.g. turn the streetlight on/ off or collect meter readings based on the configurations set up by the user.
Intelligence at Lamp Level

Luminaires and Outdoor Lighting Controller

- Controller Use existing city electricity wires for power and communications: no new wires
- Enables easy and automatic installation
- Individual luminaire on/off and dimming (0-100%)
- Automatic failure identification
- Lamp burning hours
- Voltage, Current, Active & reactive Power, Power Factor, etc.
- Consumed energy
- Standard Protocol for Communication

- Lowest energy consumption
- Lowest maintenance costs
- Increased safety and security
- Make outdoor lighting environmentally friendly
Communication

The primary means of communication – PLC

- Power line repeating dynamically discovers and maintains the best communication path to every luminaire.
- Physical communication medium less susceptible to tampering and more easily detectable
- Avoids dead spot issues typical of RF
- No external repeaters
- No problematic radio emissions

The secondary means of communication – Bridges PL and RF Networks

- Increases the number of lights per concentrator
- Decreases the number of paid wide-area communications points
- Provides reliable communications in even the most demanding physical environment
Smart City – Management System

Lamp - Antitheft
Controlling a whole city of luminaries is as quick and easy as managing a banquet hall;

Patent lighting scene management technology
Smart City – Management System

Refined Management Tool

- Purposes
- Composition
- Controller
- Dimming
- Illumination
- Design life
- Power supply

- Pole number
- Odd-even

- Pole style
- Height
- Material

- Geographic
- Road
- Location
- Layout
- Importance
- Safety

Status

Alarm
Smart City – Management System

Refined Management Tool

Precise energy consumption measurement and analysis

- Original measurement before retrofit.
- Operational measurement after retrofit.
- Comprehensive data measurement and collection (overall, luminaires, management efficiency).

Energy consumption analysis and evaluation
- Overall.
- Management efficiency.
- Losses online monitoring.

Energy-saving exploration
- Equivalent Illumination.
- State refresh Electric larceny.
- Leakage and other losses prohibited.
- Ineffective or excessive lighting cut out.
Smart City – Application Example

Road Blockade Detection and Warning
Smart City – Application Example

Vehicle Status Monitoring
Solar Panels and Energy Storage
VO-SP-3M6-37-310

Improved durability
- PID resistant and free of snail trails
- Increased module robustness to mini mize micro-cracks

Enhanced Safety
- Fire class A certified by TUV Rheinland according to
  fire test IEC 61730-2 / MST 23
- Certified for fire type13 (UL 1703)

Increased Value
- Higher maximum system voltage reduces BOS costs
- 30 year linear warranty
- 0.5% annual degradation

Certified to withstand the most challenging environmental conditions
- Module coating resistant to sand, acid, and alkali
- 2400 Pa wind load* / 5400 Pa snow load*
- 35 mm hail stones at 97 km/h

72 Cell
MULTICRYSTALLINE MODULE
16.1%
MAXIMUM EFFICIENCY
305-315W
POWER OUTPUT RANGE
0~+5W
POSITIVE POWER TOLERANCE

VaOpto Linear Performance Warranty

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VaOpto
LED Manufacturer
**SPECIFICATION**

**I-V CURVES OF PV MODULE (310W)**

- **Peak Power Watts-PMAX (W):** 305, 310, 315
- **Power Output Tolerance-PMAX (%):** 0% +5%
- **Maximum Power Voltage-VMP (V):** 36.6, 36.8, 37.0
- **Maximum Power Current-IMP (A):** 8.33, 8.42, 8.31
- **Open Circuit Voltage-VOC (V):** 45.4, 45.6, 45.7
- **Short Circuit Current-ISC (A):** 8.82, 8.91, 8.09
- **Module Efficiency η (%)** 15.5, 15.8, 16.1

STC: Irradiance 1000 W/m², Cell Temperature 25°C (77°F), Air Mass AM1.5 according to EN 60904-8.
Typical efficiency reduction of 2.5% of 900 W/m² according to EN 60904-1.

**TEMPERATURE RATINGS**
- **Nominal Operating Cell Temperature (NOCT):** 44°C (+2°C)
- **Temperature Coefficient of PMAX:** -0.41%/°C
- **Temperature Coefficient of VOC:** -0.32%/°C
- **Temperature Coefficient of ISC:** 0.05%/°C

**WARRANTY**
- 10 year Product Workmanship Limited Warranty
- 30 year Linear Power Limited Warranty
(Please refer to product warranty for details)

**PACKAGING CONFIGURATION**
- Modules per box: 30 pieces
- Modules per 40’ container: 660 pieces

*The mechanical loading is dependent upon the mounting method used and only approved clamps should be used.

**MECHANICAL DATA**
- **Solar cells:** Multicrystalline 156 x 156 mm (6.14 x 6.14 inch)
- **Cell orientation:** 72 cells (6 x 12)
- **Module dimensions:** 1978 x 992 x 6 mm (1978 x 992 x 25 mm with junction box)
- **Weight:** 28 kg (61.7 lbs)
- **Front Glass:** High Transmission, Low Iron, Heat Strengthened Glass, 2.5 mm (0.1 inch)
- **EVA:** White
- **Back Glass:** Heat Strengthened Glass, 2.3 mm (0.1 inch)
- **Frame:** Frameless
- **J-Box:** IP65 rated or IP67 rated
- **Cables:** Photovoltaic Technology cable 4.0 mm², Portrait: 250/300 mm, Landscape: 1300/1300mm.
- **Connector:** UTX Amphenol
- **Fire Type:** Type 13

VaOpto
LED Manufacturer
VO-SP-3M6A-34-312

72 Cell
MULTICRYSTALLINE MODULE

16.5%
MAXIMUM EFFICIENCY

305-320W
POWER OUTPUT RANGE

0~+5W
POSITIVE POWER TOLERANCE

Ideal for large scale installations
- High powerful footprint reduces installation time and BOS costs
- 1000V UL/1000V IEC certified

One of the industry’s most trusted modules
- Field proven performance

Highly reliable due to stringent quality control
- Over 30 in-house tests (UV, TC, HF, and many more)
- In-house testing goes well beyond certification requirements
- PID resistant

Certified to withstand challenging environmental conditions
- 2400 Pa wind load
- 5400 Pa snow load
- 35 mm hail stones at 97 km/h

LINEAR PERFORMANCE WARRANTY
10 Year Product Warranty • 25 Year Linear Power Warranty

Additional value from Trina Solar’s linear warranty

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Fax: (702) 979-3582
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VaOpto
LED Manufacturer
### SPECIFICATION

#### ELECTRICAL DATA (STC)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>305</th>
<th>310</th>
<th>315</th>
<th>320</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Power Watts - P_{MAX} [W]</td>
<td>305</td>
<td>310</td>
<td>315</td>
<td>320</td>
</tr>
<tr>
<td>Power Output Tolerance - P_{MAX} [W]</td>
<td>0 - 45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Power Voltage - V_{MAX} [V]</td>
<td>36.6</td>
<td>37.0</td>
<td>37.1</td>
<td>37.1</td>
</tr>
<tr>
<td>Maximum Power Current - I_{MAX} [A]</td>
<td>8.33</td>
<td>8.38</td>
<td>8.31</td>
<td>8.63</td>
</tr>
<tr>
<td>Open Circuit Voltage - Voc [V]</td>
<td>45.5</td>
<td>45.5</td>
<td>45.6</td>
<td>45.8</td>
</tr>
<tr>
<td>Short Circuit Current - Isc [A]</td>
<td>8.81</td>
<td>8.85</td>
<td>9.00</td>
<td>9.10</td>
</tr>
<tr>
<td>Module Efficiency - η_{m} [%]</td>
<td>15.7</td>
<td>16.0</td>
<td>16.2</td>
<td>16.5</td>
</tr>
</tbody>
</table>

*All voltage values are DC.

#### TEMPERATURE RATINGS

- Nominal Operating Cell Temperature (NOCIT): 44°C (±2°C)
- Temperature Coefficient of P_{MAX}: -0.41%/°C
- Temperature Coefficient of Voc: -0.32%/°C
- Temperature Coefficient of Isc: 0.05%/°C

#### WARRANTY

- 10 year Product Workmanship Limited Warranty
- 25 year Linear Power Limited Warranty

(please refer to product warranty for details)

#### PACKAGING CONFIGURATION

- Modules per box: 26 pieces
- Modules per 40’ container: 572 pieces

#### MECHANICAL DATA

- Solar cells: Multicrystalline 156 × 156 mm (6 inches)
- Cell orientation: 72 cells (6 × 12)
- Module dimensions: 1956 × 992 × 40 mm (77.0 × 39.1 × 1.6 inches)
- Weight: 22.5 kg (50 lb)
- Glass: 3.2 mm, High Transmission, AR Coated Tempered Glass
- Backsheet: White
- Frame: Silver Anodized Aluminium Alloy
- J Box: IP 65 or IP 67 rated
- Cables: Photovoltaic Technology cable 4.0mm² (0.006 Inches²), 1200mm (47.2 inches)
- Connector: UTX Amphenol
- Fire type: Type 1 or 2

#### MAXIMUM RATINGS

- Operational Temperature: -40~+85°C
- Maximum System Voltage: 1500VDC (IEC) 1500VDC (UL)
- Max Series Fuse Rating: 15A

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*STC: Irradiance 1000 W/m², Cell Temperature 25°C (68°F), Air Mass AM1.5.

*NOCIT: Irradiance at 800 W/m², Ambient Temperature 20°C (68°F), Wind Speed 1 m/s.

*The mechanical loading is dependent upon the mounting method. The mounting method described in the Installation Manual section 6.1-C can pass 2400Pa wind load and 2405Pa snow load.

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**VaOpto**

LED Manufacturer
VO-SP-3S6A-38-335

Maximize limited space with top-end efficiency
- Up to 178 W/m² power density
- Low thermal coefficients for greater energy production at high operating temperatures

Highly reliable due to stringent quality control
- Over 30 in-house tests (UV, TC, HF, and many more)
- In-house testing goes well beyond certification requirements

Certified to withstand challenging environmental conditions
- 2400 Pa wind load
- 5400 Pa snow load
- 35 mm hail stones at 97 km/h

72 Cell
MULTICRYSTALLINE MODULE

16.5% MAXIMUM EFFICIENCY

325-345W POWER OUTPUT RANGE

0~+5W POSITIVE POWER TOLERANCE

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_LINEAR PERFORMANCE WARRANTY_
10 Year Product Warranty • 25 Year Linear Power Warranty

Additional value from Trina Solar's linear warranty

VaOpto
LED Manufacturer
**ELECTRICAL DATA (STC)**

<table>
<thead>
<tr>
<th>Peak Power Watts-P_{MAX} (W)</th>
<th>325</th>
<th>330</th>
<th>335</th>
<th>340</th>
<th>345</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Output Tolerance-P_{MAX} (W)</td>
<td>0±5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Power Voltage-V_{MAX} (V)</td>
<td>37.6</td>
<td>37.8</td>
<td>37.9</td>
<td>38.2</td>
<td>38.4</td>
</tr>
<tr>
<td>Maximum Power Current-I_{MAX} (A)</td>
<td>8.65</td>
<td>8.73</td>
<td>8.84</td>
<td>8.90</td>
<td>9.00</td>
</tr>
<tr>
<td>Open Circuit Voltage-V_{OC} (V)</td>
<td>46.0</td>
<td>46.2</td>
<td>46.3</td>
<td>46.5</td>
<td>46.7</td>
</tr>
<tr>
<td>Short Circuit Current-I_{SC} (A)</td>
<td>9.17</td>
<td>9.27</td>
<td>9.36</td>
<td>9.45</td>
<td>9.50</td>
</tr>
<tr>
<td>Module Efficiency ηm (%)</td>
<td>16.8</td>
<td>17.0</td>
<td>17.3</td>
<td>17.5</td>
<td>17.8</td>
</tr>
</tbody>
</table>

*All voltage values are DC.*

**TEMPERATURE RATINGS**

| Nominal Operating Cell Temperature (NOCT) | 44°C (±2°C) |
| Temperature Coefficient of P_{MAX} | -0.41%/°C |
| Temperature Coefficient of V_{OC} | -0.32%/°C |
| Temperature Coefficient of I_{SC} | 0.05%/°C |

**WARRANTY**

10 year Product Workmanship Limited Warranty
25 year Linear Power Limited Warranty
(Please refer to product warranty for details)

**PACKAGING CONFIGURATION**

Modules per box: 26 pieces
Modules per 40' container: 572 pieces

**MAXIMUM RATINGS**

| Operational Temperature | -40 to +65°C, -40 to +185°F |
| Maximum System Voltage | 1500VDC (IEC), 1500VDC (UL) |
| Max Series Fuse Rating | 15A |

**MECHANICAL DATA**

| Solar cells | Monocrystalline 156 x 156 mm (6 inches) |
| Cell orientation | 72 cells (6 x 12) |
| Module dimensions | 1956 x 992 x 40 mm (77.0 x 39.1 x 1.6 inches) |
| Weight | 27.6 kg (61 lb) |
| Glass | 4.0 mm (0.16 inches), High Transmission, AR Coated Tempered Glass |
| Backsheet | White |
| Frame | Silver Anodized Aluminium Alloy |
| J-Box | IP 65 or IP 67 rated |
| Cables | Photovoltaic Technology cable 4.0mm² (0.006 inches²), 1200mm (47.2 inches) |
| Connector | UTX Amphenol |
| Fire Type | Type 1 or 2 |

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**VaOpto**

LED Manufacturer
SYSTEM EFFICIENCY IMPROVEMENTS
- Generation and load decoupling
- Thermal assets operation at optimal output
- Asset efficiency and utilization improvement
- Operating and maintenance cost reduction
- Emission reduction

RENEWABLE ENERGY INTEGRATION
- Intermittency mitigation
- Greater ramp rate control

ENERGY SECURITY
- Support utilization of diverse energy supplies, including renewable sources

CONTAINERIZED SYSTEM

ENERGY STORAGE

<table>
<thead>
<tr>
<th>Feature</th>
<th>1 MWh / Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Rating [kW]</td>
<td>500 / 1,000</td>
</tr>
<tr>
<td>AC Voltage [V]</td>
<td>200</td>
</tr>
<tr>
<td>Grid Frequency [Hz]</td>
<td>50/60</td>
</tr>
<tr>
<td>THD</td>
<td>&lt; 3%</td>
</tr>
<tr>
<td>Operating Temperature Range [°C]</td>
<td>-20 ~ 50 (-4 ~ 122°F)</td>
</tr>
<tr>
<td>IP Protection Class</td>
<td>IIP54</td>
</tr>
<tr>
<td>Dimensions [mm]</td>
<td>12,024<em>2,352</em>2,390 (473<em>93</em>94 inch) [40’ container]</td>
</tr>
</tbody>
</table>
APPLICATION

GENERATION
- System Capacity
- Price Arbitrage
- Frequency Regulation
- Renewable Energy Integration
- Reserve Spinning
- Power Plant Hybridization
- Ramp Rate Management

DISTRIBUTION
- Voltage Compensation
- Power Quality and Reliability
- Residential and Industrial Backup Power
- Micro-grid and Island Grid Support
- Investment Deferral
- Congestion Relief
- Distribution Upgrade Support
- Peak Load Reduction

TRANSMISSION
- Investment Deferral
- Power Quality Improvement
- Voltage Compensation
- Dynamic Line Rating Support
- Renewable Energy Integration
- Dynamic Stability Support
- Loss Reduction
- Congestion Relief

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