

A value-added distributor's design chain

***HB LED Lighting
HKPC Symposium
7~8 May 2009***

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Regional President
Avnet Electronics Marketing**



Avnet at a Glance



- ✦ Avnet, Inc. (NYSE: AVT), a Fortune 500 company, is one of the world's largest technology marketing, distribution and services companies.
- ✦ Incorporated in 1955, NYSE: AVT 1960
- ✦ Over 12,000 employees in over 70 countries
- ✦ **Avnet Electronics Marketing Asia**
 - Leading electronics component distributor in Asia
 - Distributor to provide value added design chain in LED lighting
- ✦ **Year entering into Asia Market: 1995**
- ✦ **No. of offices in Asia Pacific: 41 (except Japan)**
- ✦ **No. of employees: 2,216**
- ✦ **No. of product line: 150**
- ✦ **No. of design center: 6**
- ✦ **No. of logistics center: 7**
- ✦ **Asia Pacific headquarters: Singapore**



Avnet's headquarters in Arizona

Avnet Key franchises in Asia



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Why Green?

Background

China, undergoing rapid industrialization, faced the pressures of promoting growth while saving resources and protecting the environment.

China is a major carbon emitter, with about 19% of the global emissions of CO₂, according to a World Energy Council report, 2008.

我国节能减排任务仍很艰巨

近两年，我国节能减排工作取得明显成效。但从总体看，实现“十一五”节能减排目标所面临的形势仍然十分严峻，任务相当艰巨

2008年上半年

2007年与2005年相比

2008年上半年		全 国	2007年与2005年相比	
	↓下降			↓下降
单位GDP能耗	2.88%	单位GDP能耗	5.38%	26.9%
二氧化硫排放总量	3.96%	二氧化硫排放总量	3.18%	31.8%
化学需氧量排放总量	2.48%	化学需氧量排放总量	2.18%	21.8%

完成5年目标的



Why Green?



Support & Investment from the China Government – Green Lighting

China approved a massive 4-trillion yuan (\$586 billion) two-year investment plan in November, 2008. The spending list also included a **210 billion yuan investment in environmental protection and energy conservation.**

(from the National Development and Reform Commission)

The China government will continue energy conservation in the three key areas of industry, transportation and construction. **It will also speed up the construction of 10 key energy conservation projects, such as** upgrading coal-burning furnaces, **green lighting**, and energy conservation in government organizations.

(from Premier Wen Jiabao)

“...large-scale use of light-emitting diode **(LED) lighting** would be promoted in dozens of big Chinese cities and the use of solar and wind energy would be accelerated.”

(from Wan Gang Minister of Science and Technology)

Avnet's Green Initiative



- ✦ Avnet as a global electronics component distributor, also a responsible company to the industry and community
- ✦ Avnet's green / environmental Initiative
 - ✓ Compliance to international standard
 - European Restriction of Hazardous Substances (RoHS) directive
 - ✓ Green lighting unit "LightSpeed" to drive energy conservation initiatives
 - ✓ Green solutions and products from regional/ local teams
- ✦ Lighting – one of the key segments for energy consumption

Green Compliance



Drive for compliance with **EU RoHS environmental directives** to meet with today's market requirement

Avnet Solutions	Premiere Green Custom
Lead-free "yes/no"	✓
List 6 banned RoHS substances	✓
RoHS-compliant	✓
Reflow temperature	✓
Supplier conversion methodology	✓
Supplier implementation timeline	✓
JESD-97 Codes	✓
Product Change Notices	✓
Material Specification Sheets	✓
Part availability after July 2006	✓
Part Data Creation	✓

Green Solution by Design Team



In Asia, **Avnet Design Service (ADS)**, a unit of Avnet Electronics Marketing Asia is specializing in design services

- ✦ Lighting Design team in Shenzhen - a solution provider for LED related application
- ✦ **Focused in LED market** through its expertise knowledge of **electronics/ control/ optic/ thermal** sharing across regions
- ✦ **Local Design centers** to serve local demand
 - e.g. street lighting in China & solar lantern in India
- ✦ Availability of **energy saving technology**
 - National Semiconductor's
- ✦ Offers **ready turn-key and reference solution** shared across Design center in APAC and LightSpeed US
- ✦ Leverage technology of partners such as IDH, Academic Institute, Government R&D body

Avnet Asia's Green Strategies



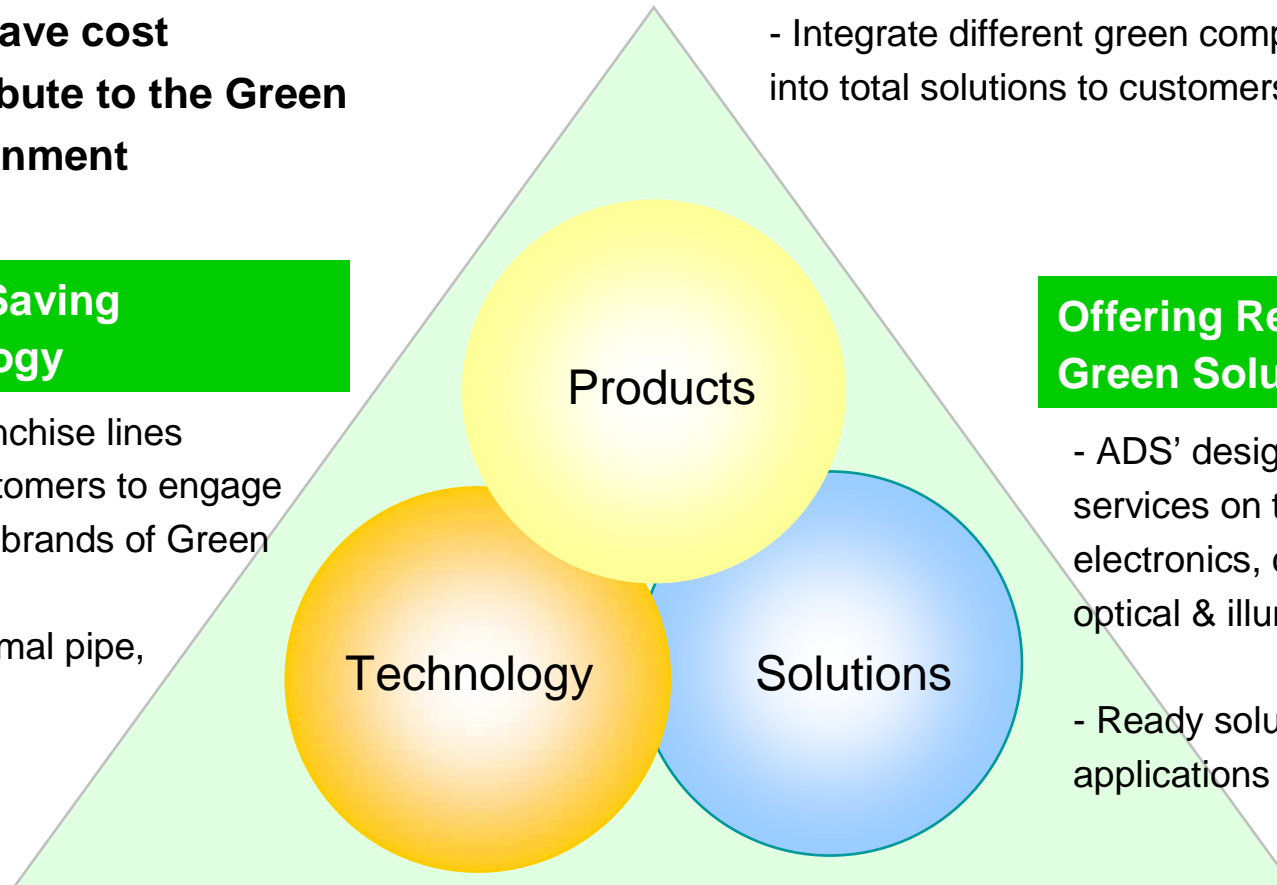
- Time-to-market for customers
- Help end-users to save energy thus save cost
- Contribute to the Green environment

Providing Green Products

- Integrate different green components into total solutions to customers

Energy Saving Technology

- From franchise lines
- Help customers to engage with new brands of Green Product, e.g. Thermal pipe, Nuventix



Offering Ready Green Solutions

- ADS' design consultation services on total solution of electronics, control, thermal, optical & illumination level
- Ready solutions for different applications

Avnet Asia's Green Alliance



Partnership with HKPC

- Forming strategic partnership to jointly facilitate LED development
- Avnet to be responsible for marketing, application, design and project development of LED products;
- Area of development - project design, light guide design, lighting simulation, heat dissipation design....;
- meet periodically for project & market update



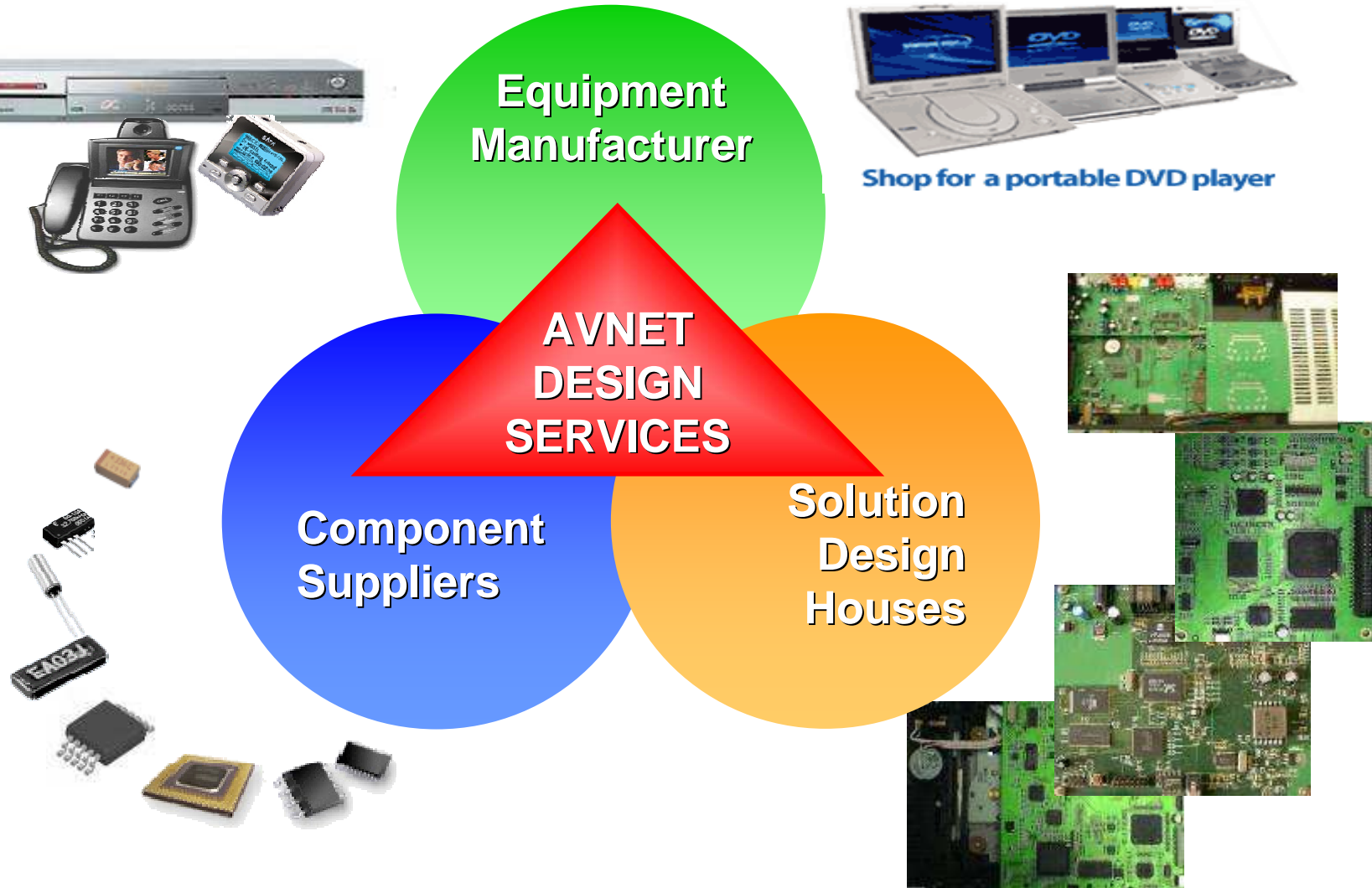
Avnet Design Service – Green Solutions

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Avnet Design Services



Shop for a portable DVD player



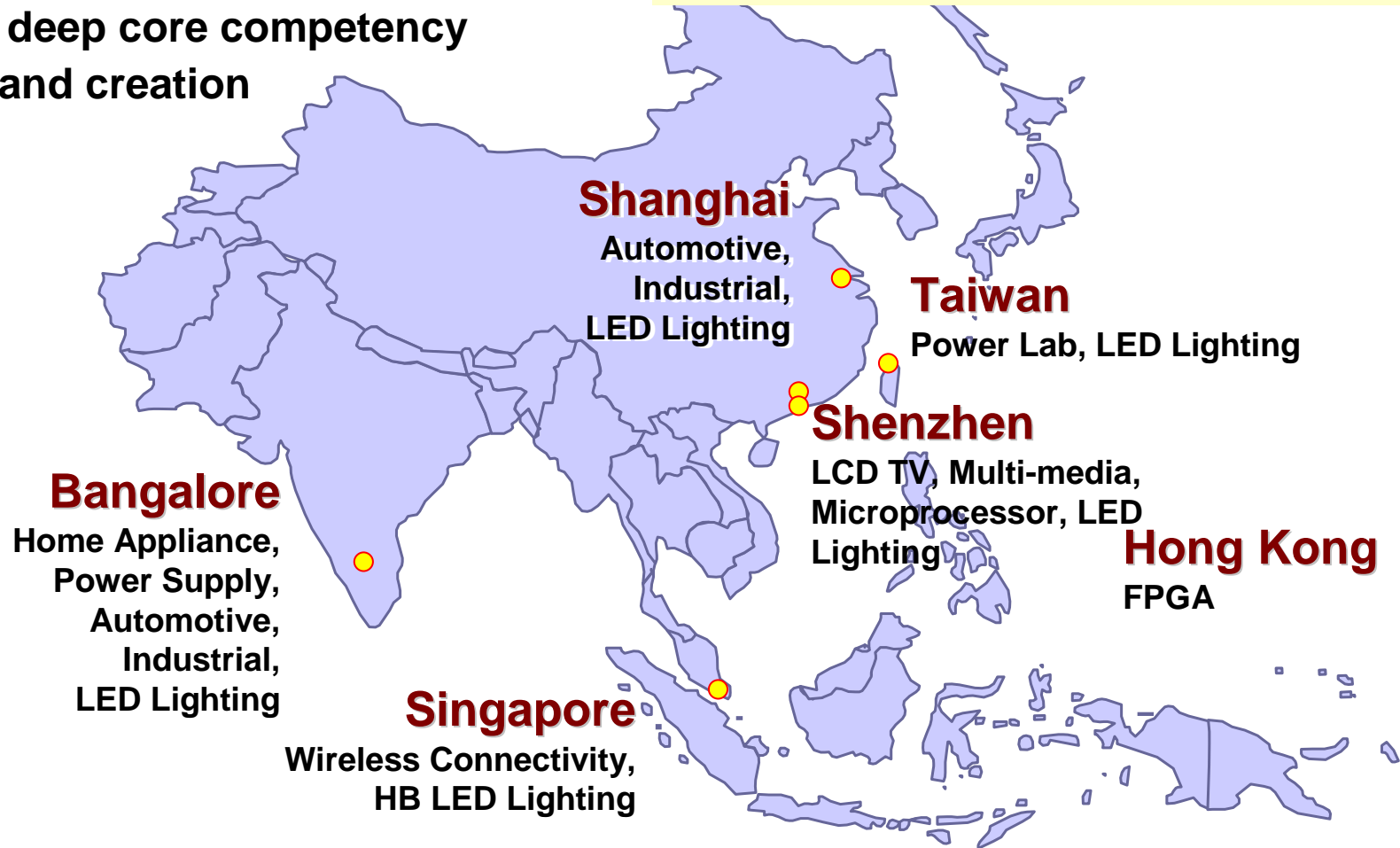
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ADS Capabilities

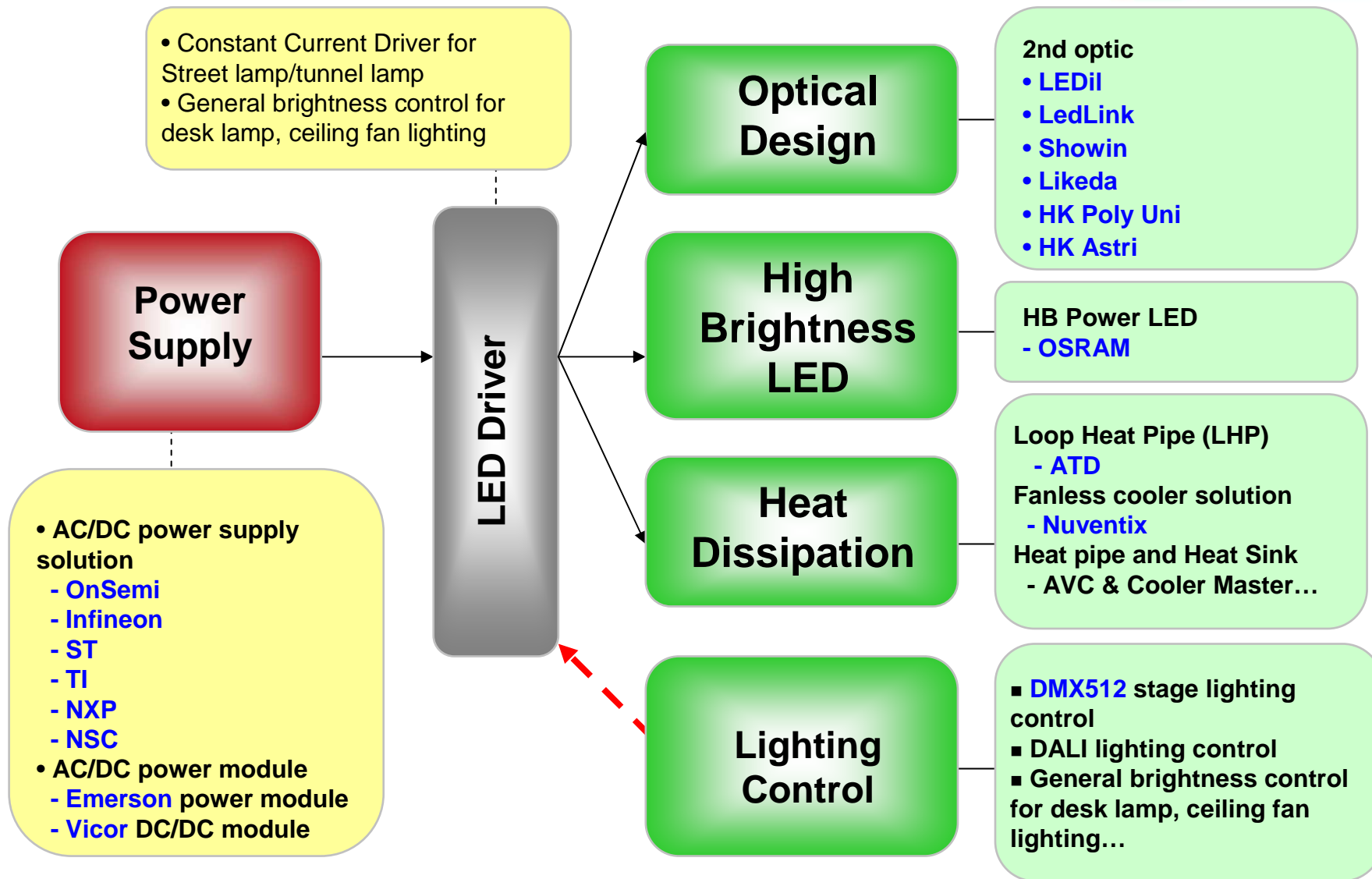


Strong board design capability adds a deep core competency in demand creation

6 Design Centers in Asia
Focus at distinct market segments



Avnet's LED Synergy Solution



Avnet's Investment in Design Chain



Electronics

- Power management: AC/DC & DC/DC
- LED driver
- Control: MCU and FPGA
- Hardware support: level of system control to PCB layout
- Software support: level of system control and LED lighting control; specialize in DMX512

Optic

- Support of 2nd optic design
- Illumination consultant on single LED to system level

Thermal

- Thermal management
- Design of passive & active solution

Turn-key solution

- Design and consultant services on total solution of electronics, control, thermal, optical & illumination level

Ready Green Solutions



- Thermal solution for LED Lighting
- Total Turn-key solution for LED Lighting
 - Architecture lighting
 - Street lighting
 - General lighting
 - Portable lighting

Thermal solution for LED Lighting

Loop heat pipe (LHP) is a heat-transfer device utilizing a fine porous or wick structure in micro scale to achieve remote heat transport with high power.

Special features:

- Heat transport in long distance, several meters distance
- High power, as high as several hundreds Watt
- Flexible, bendable connecting pipe
- Anti-gravity operation, maintaining high heat transfer capability in anti-gravity direction
- Passive heat-transfer device, no external power input



LHP is flexible & bendable connecting pipe that can be designed for different appearance

LHP inside 100W LED street lamp



Thermal solution – Nuventix



Avnet introduces SynJets of Nuventix

- Higher Thermal Efficiency, allows for twice the light output
- Near Silent Operation, lights should be seen and not heard
- Flexible Form Factor, traditional as well as radically new design possible
- Green, better Lumens per Watt
- High Reliability, 100,000 hours of L10 life at 50C



SynJets for Various Applications

Advantage of SynJets

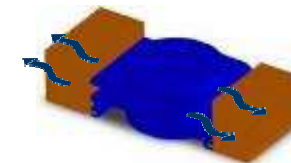
- Ability to take the cooling to the LED heat source instead of taking the heat to the cooling
- Multi directional and unique circular designs
- Extreme reliability and harsh environments to meet the LED demands



LED TV



LED Headlight



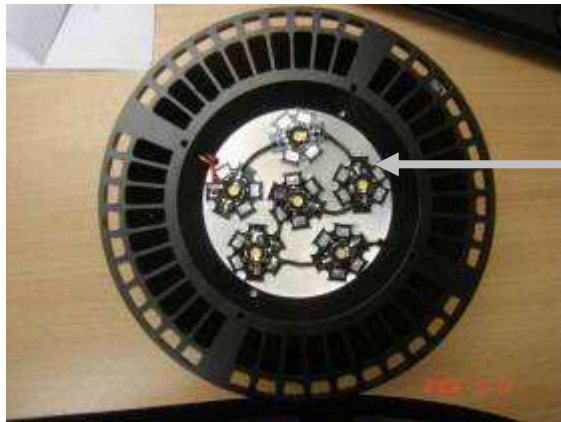
LED Pocket Projector

Thermal Solution – MR16 15W & PAR38 30W Demo Kit



LED Driver

- Drive up to 6pcs of 5W LED OSRAM LUWW5AP with 1.4A;
- Drive 6-die 15W OSRAM Ostar LED with 700mA



OSRAM Single Die 5W LED with 1.5A/3.5Vf (OSRAM Part# LUWW5AP)

OSRAM 6-Die 15W Ostar with 700mA/20.8Vf (OSRAM Part# LE-UW-E3B)



Street Lighting

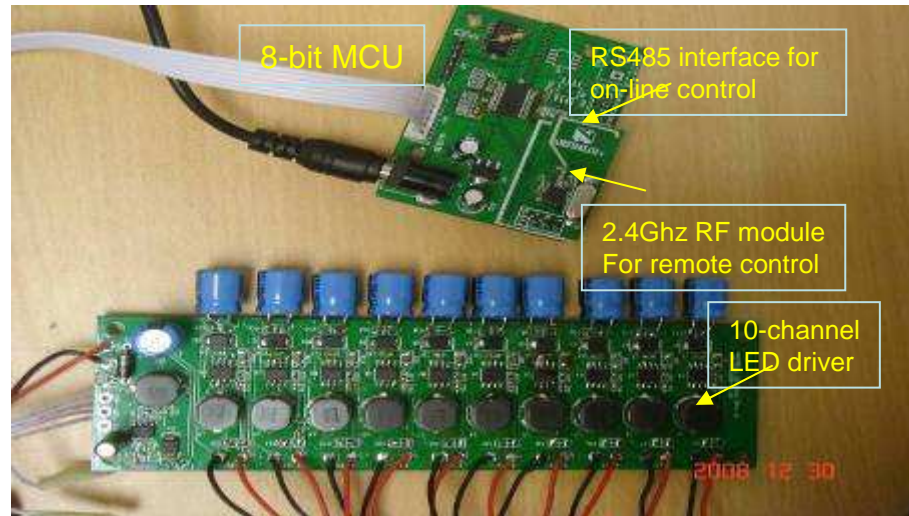


Street Lighting Reference Design

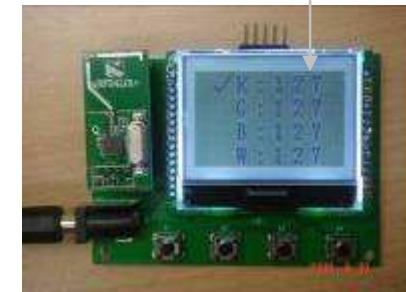
- LED
OSRAM Golden Dragon with integrated lens x 16 unit
- View Angle
Horizontal 120 degree, vertical 80 degrees
- Luminous Flux
up to 85 lm (GD+ series 110 lumens) @ 350mA, 3.2V

Street Lamp LED Driver Module

- MCU integrate function of
- Control on timer/dimming/remote control
 - Interface with LED driver



LCD for display

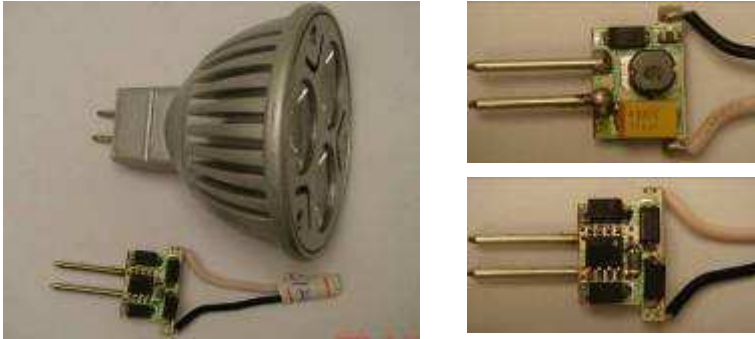


Key-in button for adjusting parameters for real timer, brightness duties, & other control information

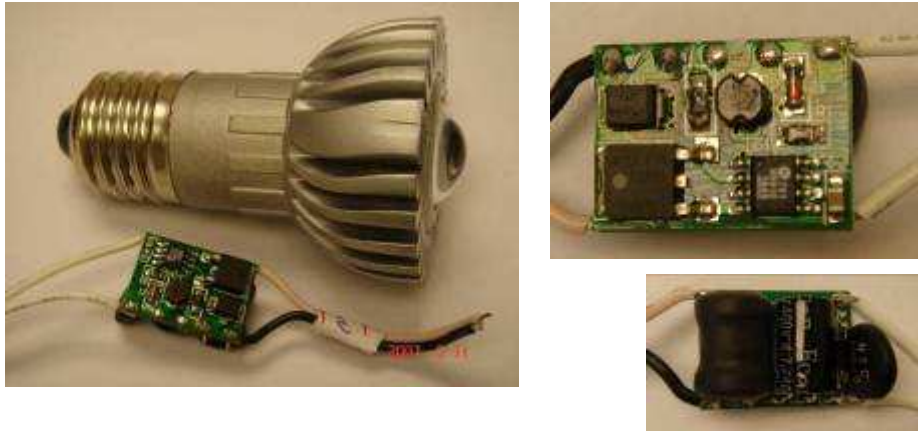
General Lighting



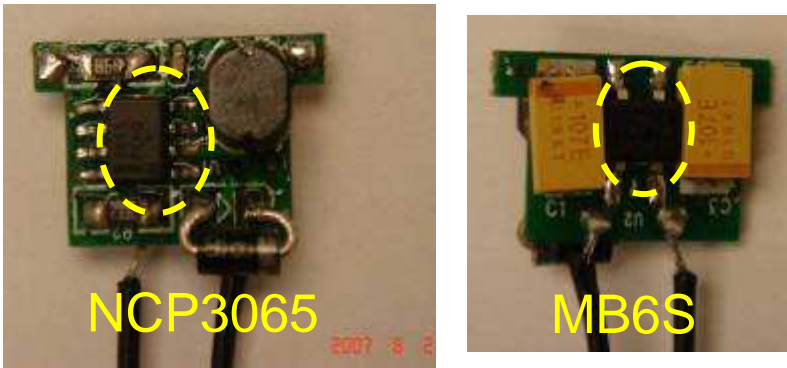
Turn-key Design of MR16 LED Bulb



Drivers for 220Vac JUDR/JDR LED bulb



NCP3065 demo board for driving 1W, 3W MR16 LED bulb

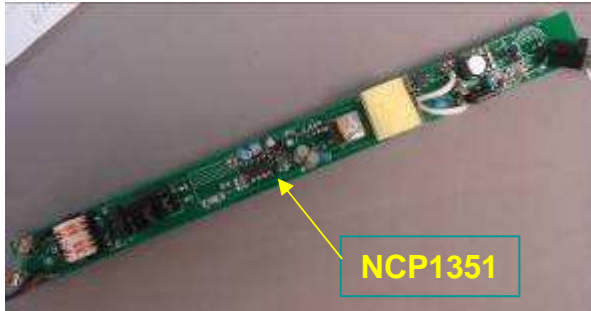


OSRAM LED in Reading Lamp

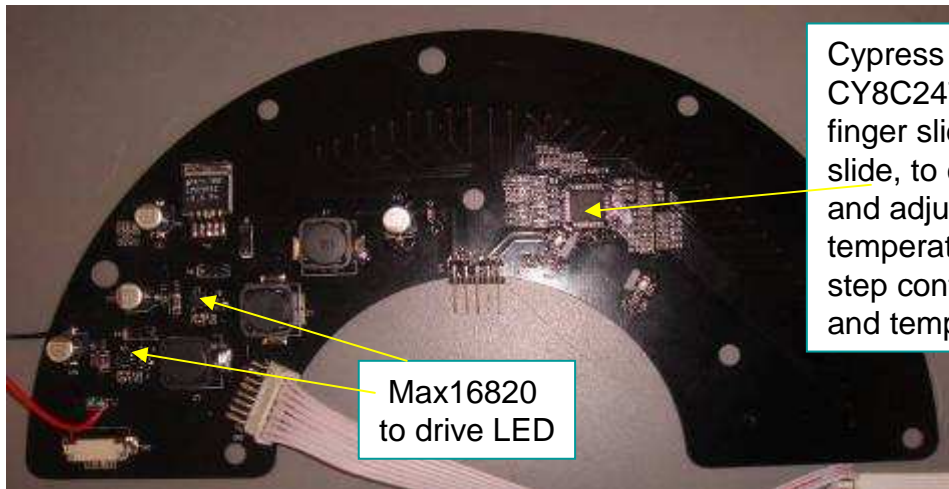


General Lighting

T5 sized LED daylight
with Isolated AC/DC driver board of
NCP1351 (up to 18W) & OSRAM LED



Control & LED Driver Board



Cypress PSoC
CY8C24784 to sense the
finger sliding position on
slide, to control brightness
and adjust color
temperature, provide 18
step control of brightness
and temperature



slight touch
button for
LED on/off

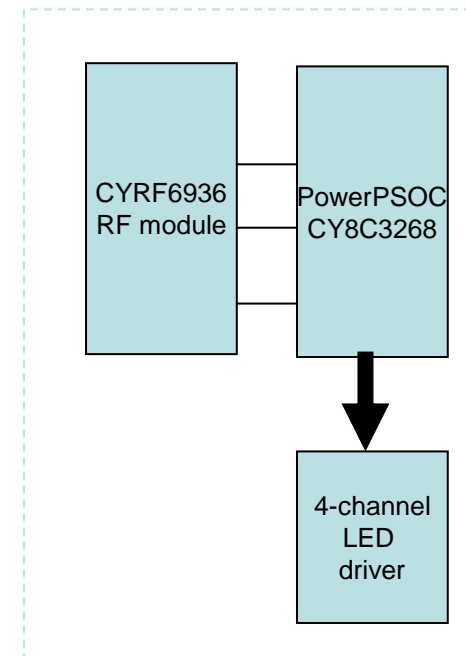
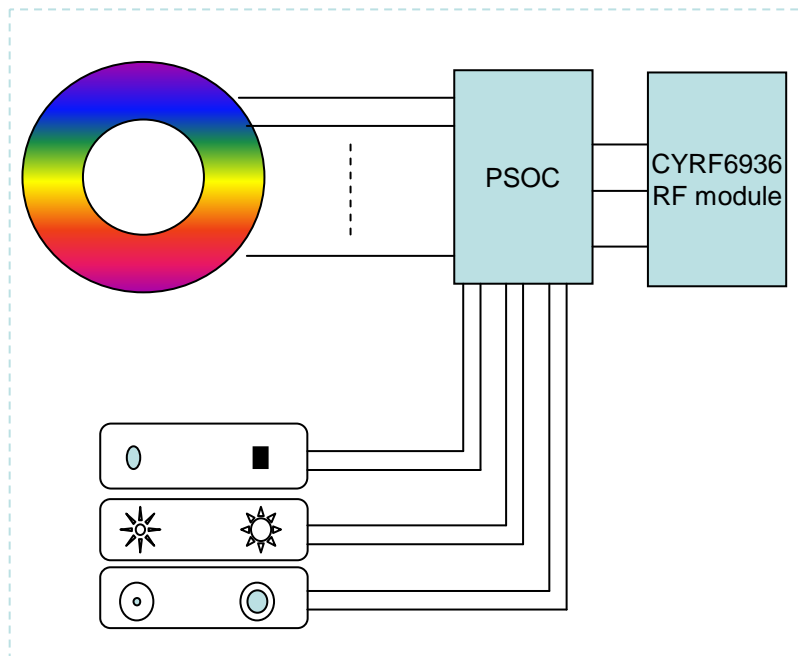
Two slight
touch
sliders

General Lighting

Life style lighting concept Demo



- 2.4G remote implemented with M-touch features
- MCU – Cypress CY8C3268
- RF remote control -- CYRF 6936
- Conceptual demo



Portable Lighting



LED Torch control board driving up to 10W

Features

- Battery voltage from 6Vdc to 9Vdc
- drive current up to 1.4A for 1pc of 5W high brightness LED (OSRAM Diamond Dragon)
- 3 kind of work mode switching by press power button quickly
 - 100% brightness
 - 75% brightness



8bit MCU



max16820

OSRAM LED inside LCOS optic engine

- Palm Projector



LUWW5AM for Himax solution

- Companion Projector



LE-ATB-E3B for DisplayTech solution

- Embedded Projector



Solar Lantern Reference Design

LED:

- OSRAM 3W LED Golden Dragon plus x 1 unit

OSRAM Part

- LUW W5AM

Duty Cycle:

- 6 hours of lighting per day under
- Average solar radiation of 5kWh/sq.m

Usage:

- Continuous for 18 hours on full charge



Key obstacles in LED lighting

- High start up cost
 - Incandescent light bulb US\$0.3/ klm
 - Florescent Tube US\$0.6/ klm
 - Compact florescent US\$5.0/ klm
 - LED US\$50.0/ klm

- It requires 10X cost improvement
 - Efficiency: 85lm/W to 150lm/W 2X
 - Driving current: 35mA to 100mA 3X
 - Manufacturing cost 1.5X
 - Total 10X

- Consumer/ manufacturers lack of knowledge of LED lighting
 - Require education by government body

- Lack of standard and legality effort
 - Legacy from current lighting industry standard
 - Legal enforcement in lighting efficiency

Summary



- HB LED are improving rapidly and continuous improvement is expected
- LED performance with ~80lm/W is in production and ~150lm/W is expected in coming future
- LED for Notebook backlight will become mainstream in next few years
- LED for LCD TV is starting and will become popular once the cost was resolved
- LED is a potential dominance in general illumination market in next 10 years. Performance improvement and cost reduction will be the key
- Avnet is playing a role to bridge the technology to the general market by adding value in the design chain and promoting the solid state lighting concept in the lighting industry



Avnet, being a **DEVICE** and **SOLUTION** provider,
drives and accelerates implementation of **GREEN**
ILLUMINATION and related application to the market.

Through integrating partners & IDH, we bring broad area
of latest new technology and offer services of Design
chain & Supply chain to facilitate application development.



Thank You

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Appendix

Avnet Asia's Green Strategies



Avnet EM Asia as the value-add electronics component distributor, is dedicated to promote green initiatives by

➤ Providing Green Products

- Leverage a broad array of product franchise, integrate different green components into total solutions to customers
- Time-to-market for customers
- Help end-users to save energy thus save cost
- Contribute to the Green environment

➤ Introducing New Brands with Green Offering

- Leverage our global coverage, help customers to engage with new brands of Green Product e.g. Thermal pipe, Nuventix
- Assist customers to acquire the products to be part of their system

➤ Offering Ready Green Solutions

- ADS' LED experts to provide design consultation services on total solution of electronics, control, thermal, optical & illumination level
- Ready solutions on different applications