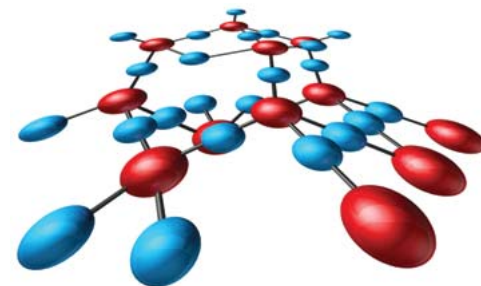


Delivering **MORE** Together



Bringing Light to Life



Jim Perkins

Texas Instruments Inc

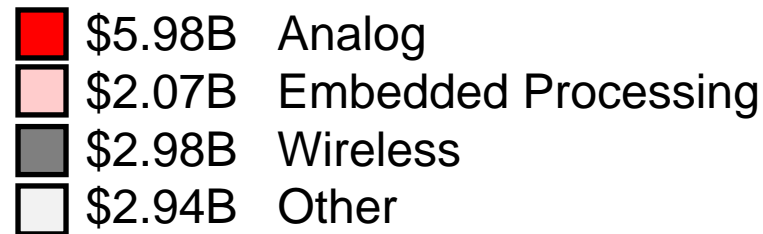
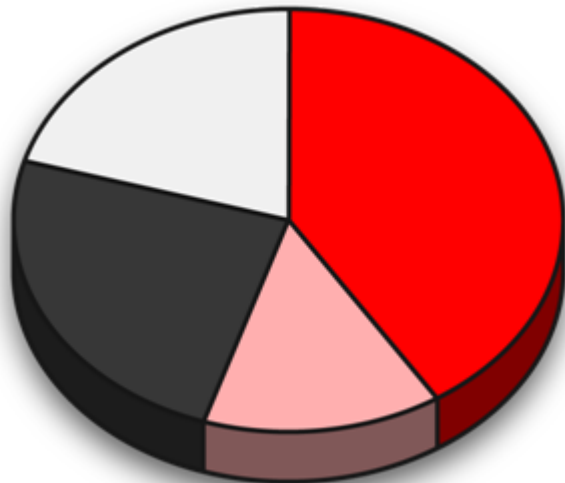
- **About TI:**

- one of the world's largest semiconductor companies

- **History:**

- Founded in 1930 as a geophysical exploration company
- Adopted the name Texas Instruments Incorporated in 1951
- Introduced the first commercial silicon transistor in 1954

- **2010 TI Revenue:**

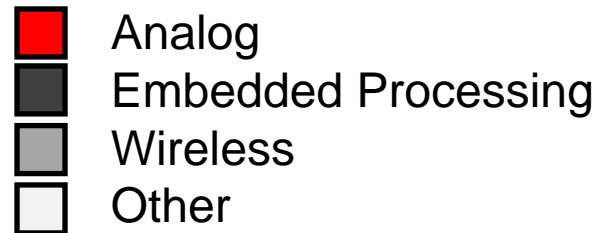
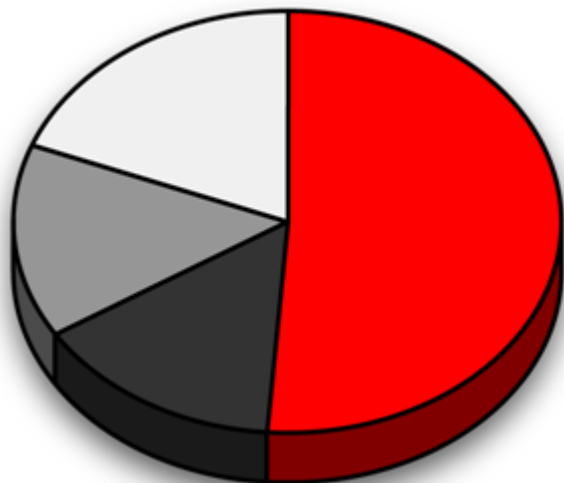


\$13.97B Total

National Semiconductor Acquisition

- **Texas Instruments completes acquisition of National Semiconductor**
 - Over 32000 employees
 - \$15.6B combined revenue CY2010
 - 17% Combined Analog market share
 - Over 40000 Analog products

- **TI+SVA Revenue partition:**



Analog now >50%

Delivering MORE Together

- **MORE design and development** to keep our customers at the forefront of innovation.
- **MORE products with** a portfolio of nearly 45,000 analog products delivering the performance, power and packaging options for the most demanding applications.
- **MORE support** with the largest sales and applications team in the industry and leading online tools to make the product selection, evaluation and design process easier.
- **MORE manufacturing capacity and a technology investment** unmatched by any analog semiconductor company in the world.

MORE for our customers

Texas Instruments & OSRAM



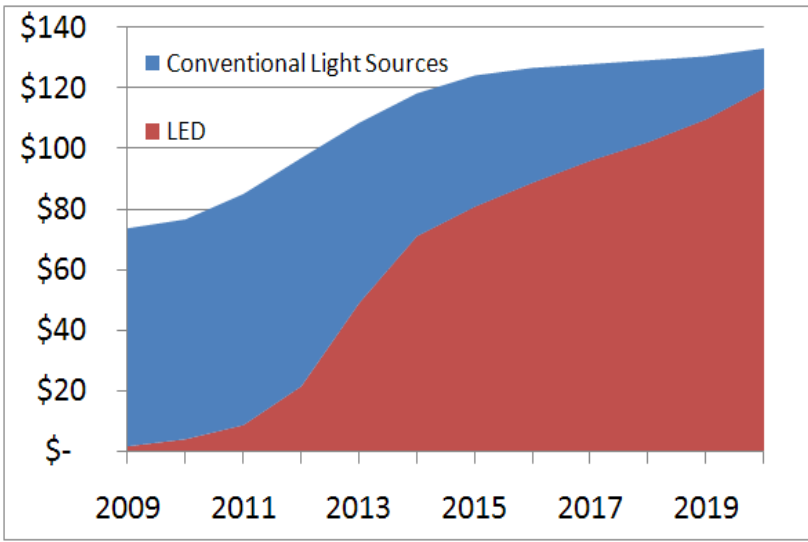
- **Electronic Solutions Partner**

- LED Driving ICs.
- Additional Electronic Solutions: Sensing, Control, Communications and System Power

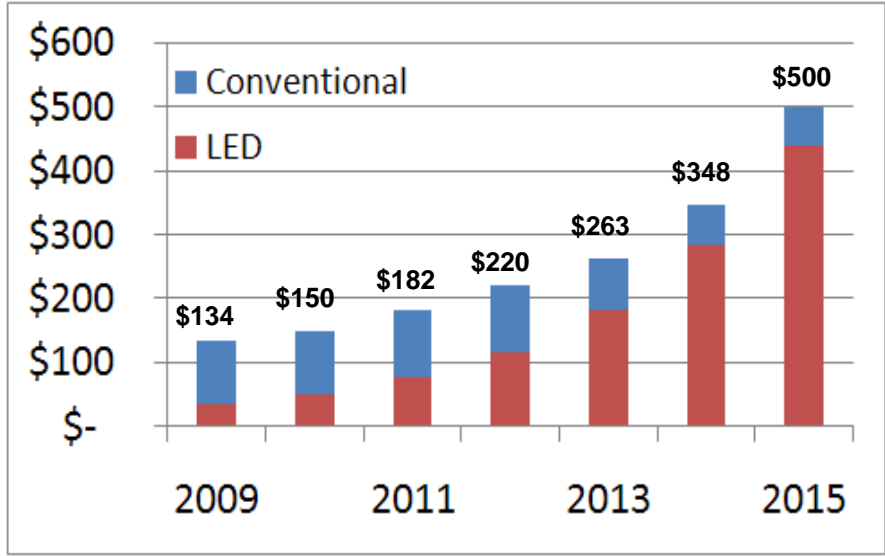
Lighting TAM: \$500M in 2015

LED lighting will lead the growth in the lighting market

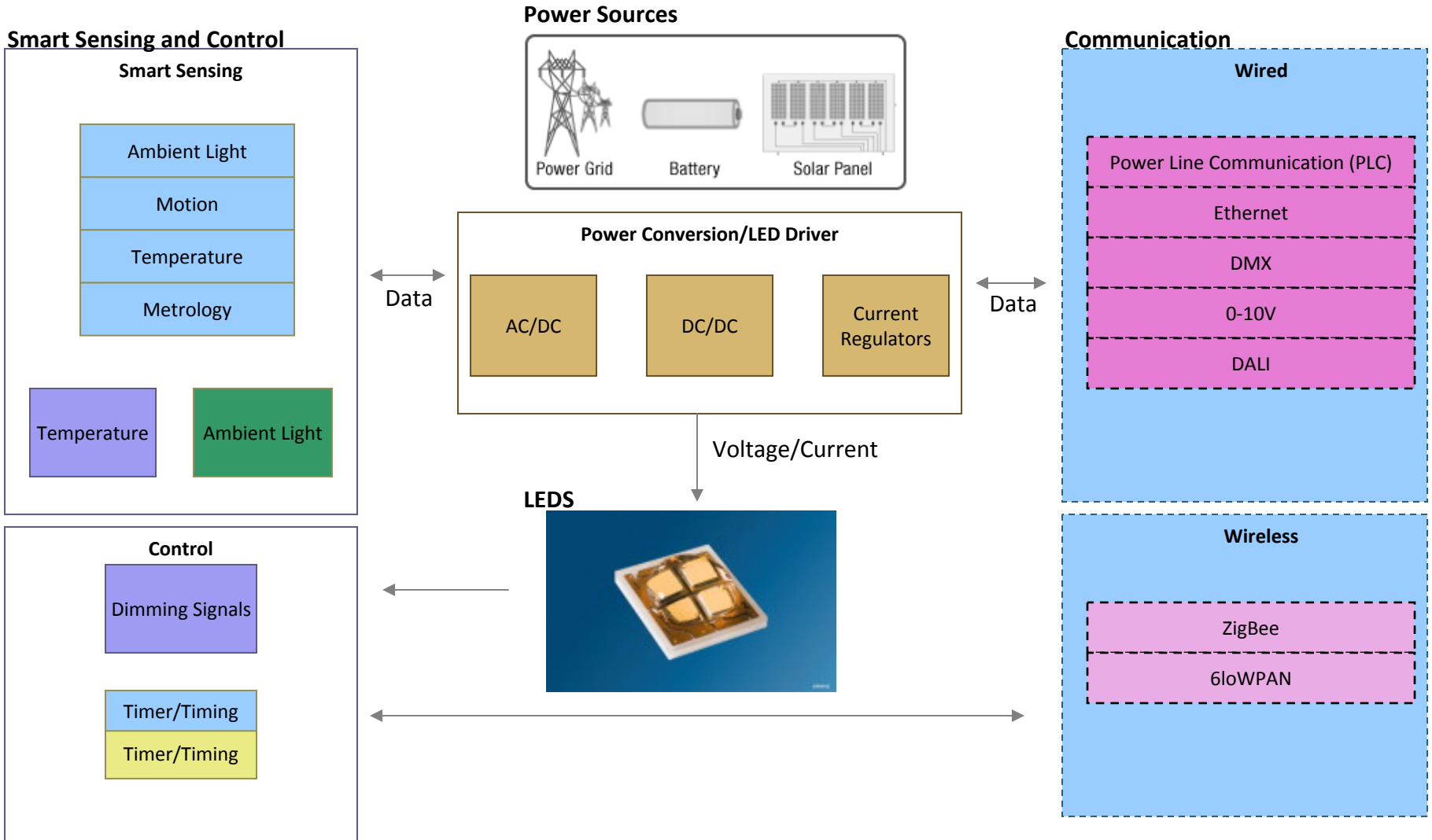
General Lighting Market (\$B)



Lighting SC TAM (\$M)



Lighting Block Diagram



Focus Markets

LED Bulb



Downlight



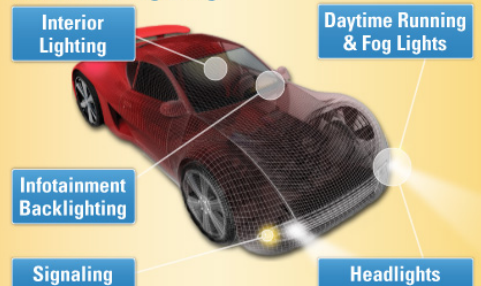
Outdoor Area



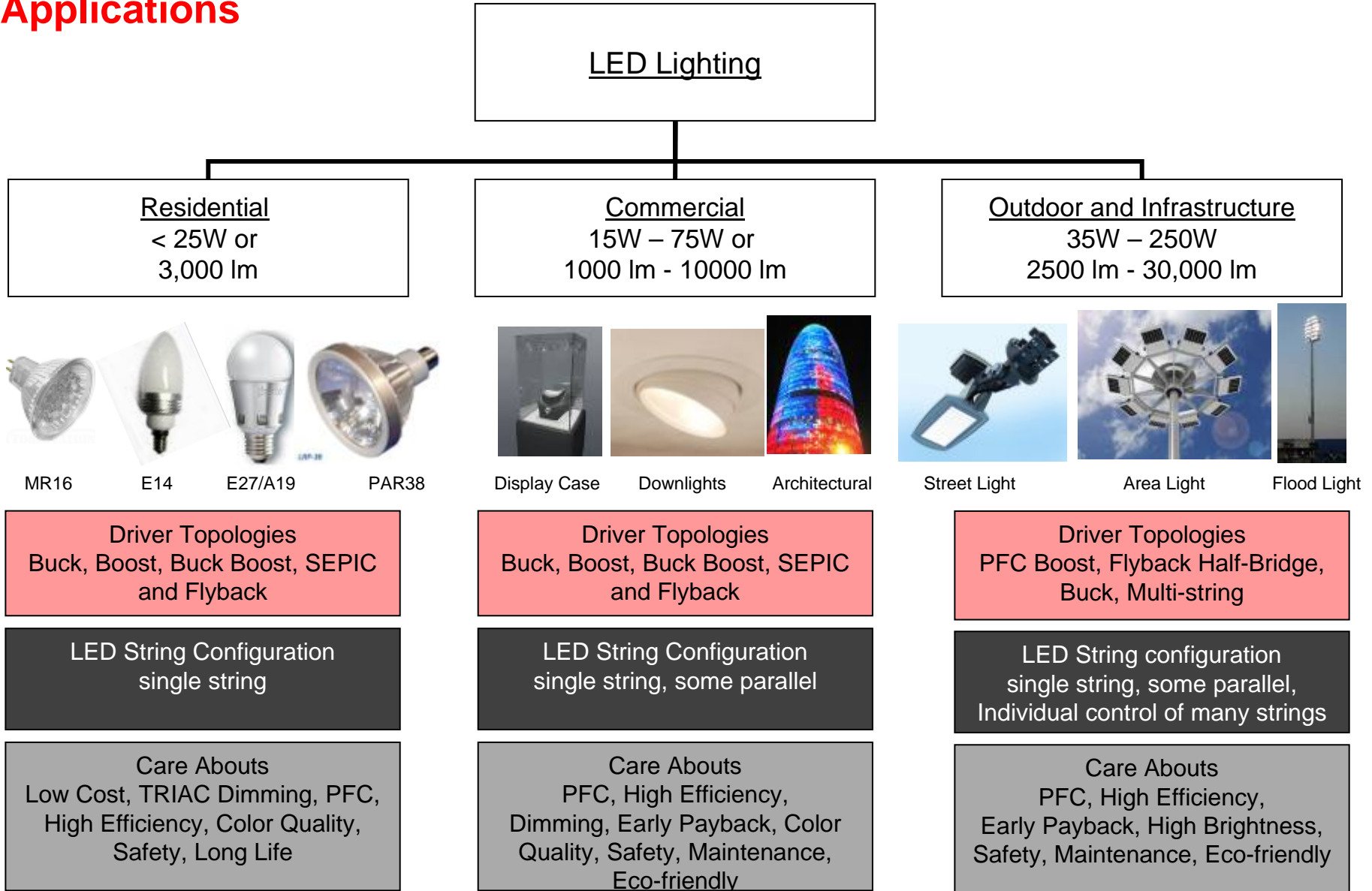
Additional Markets

- Automotive
- Architectural
- Projection and Entertainment
- Industrial
- Portable Consumer
- Backlighting

Automotive Lighting







LED General Illumination Applications



Key Questions for Driver Design

Control is needed for LED current regulation and dimming functions

End Application	<p><u>Bulb replacement</u> Using existing socket and bulb form factor with LED and power mgt content</p> <p>OR</p> <p><u>Luminaire</u> Creating a new design using LED arrays</p>	 
LED Component Selection	$V_f = ?$ $I_{LED} = ?$	
LED Configuration	Series or parallel	
Input Voltage	12V _{dc} , 120V _{ac} , 230V _{ac} , 90-265V _{ac} , 90-305V _{ac}	
Current I_q and I_{out}	I_q (mA) I_{out} (A)	
Output Channels (Strings)	# of output channels/# of strings	
Isolation	Isolated/Non-isolated	
Dimming	No/Yes, what type (TRIAC, PWM, 0-10V)	
Power Management	Analog or digital	
Other features	Communications, control, sensing ¹	
Thermal Design ²	Heat sink location/airflow	
Optics and Reflectors ²		

Webench LED Architect

My Designs/Projects English | 日本語 | 简体中文 | 繁體中文 | 한국어 | Русский Язык | Português | Deutsch Welcome Jim Perkins

OSRAM

Opto Semiconductors

New **Select LED** Select Driver Assistant

LED ARCHITECT

Power LED **LED Architect** Power Architect FPGA/μP HotSwap

WEBENCH® LED Optimizer

Lowest BOM Cost
Smallest Footprint
Highest Efficiency

Footprint: **17.79**
BOM Cost: **\$10.16**
Efficacy: **79.80**

LED Requirement

DC AC
Vin Min: 15 V Max: 30 V
Amb. Temp: 30 °C
Light Out: 500 lm
Color:

Show Advanced Inputs >>
Recalculate

Filter Results

Efficacy: 65 84 LED Io (<=): 0.14A 0.5
Footprint 11cm² 26cm² Color 6500 65
BOM Cost \$0 \$11 Lumens/ LED: 29 1
Total # 4 17 Junction 92
LEDs (<=):

Advanced Charting

X Axis: Efficacy Y Axis: Footprint Bubble Size: BOM Cost

Step 1: LED and Heat Sink Selection

LED Array Solutions: (3 found) Show All Columns

Select	LED Part Number	LED Manufacturer	LED Top View	# of LEDs	LED+H Cost (\$)
Select LED	LUW CP7PKTLP5C8E	OSRAM		4	\$10.
Customize LED	Detail				

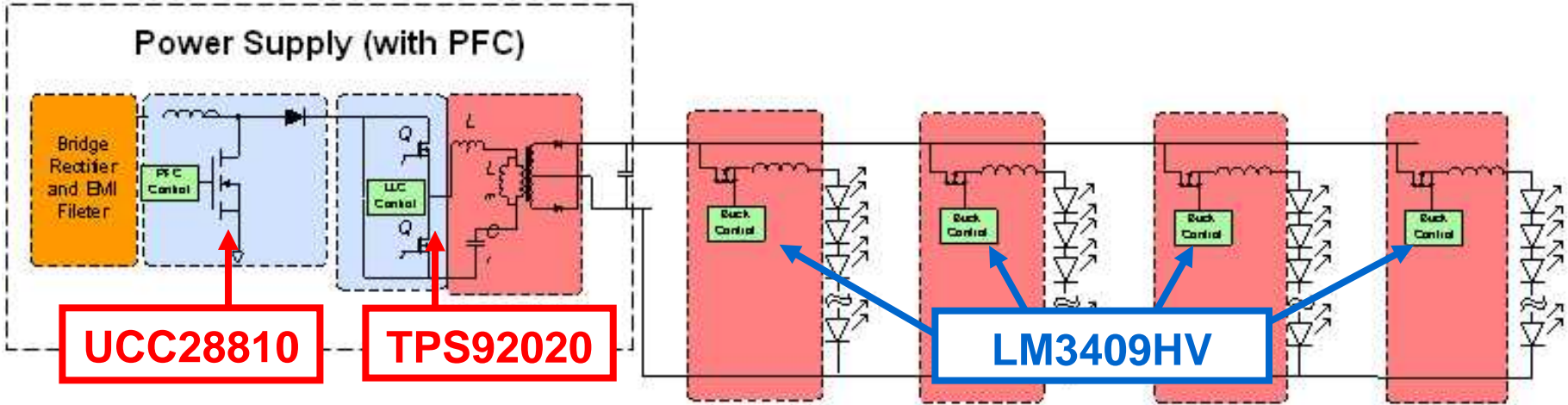
High Bay LED Lighting solution

 Active PFC LED Power Controller
UCC28810

Resonant Switching LED Driver Controller
TPS92020



 Common Cathode Constant Current Buck LED Driver
LM3409HV



Summary

- **LED Lighting Product Portfolio**
 - Wide selection of constant current driving solutions.
 - AC, DC and battery powered solutions.
 - Low, medium and High Power.
 - Enhance features for higher performance.
- **Additional Functions for Smart Lighting**
 - Smart sensing and control
 - Communications
- **Ease of Use**
 - Highly integrated solutions
 - Webench LED Architect tools
 - Evaluation boards and reference designs