

# Microcontrollers for Fluorescent and High Intensity Discharge Lamp Ballasts

SMARTER, MORE FLEXIBLE LIGHTING SOLUTIONS



Developed together with the industries leading lamp ballast manufacturers, Atmel® microcontrollers are optimized for Linear and Dimmable Fluorescent tubes, as well as High Intensity Discharge (HID) ballasts. Their dedicated features allow for truly intelligent lighting networks, resulting in energy savings.

Regulation passed by the U.S. Department of Energy and the ballast directives adopted by the European Community have urged the lighting industry to shift towards the use of more efficient, energy-saving products, such as the electronic ballast.

The electronic ballast is an efficient electrical device that supplies a controlled current to start and run **fluorescent and high intensity discharge (HID) lamps**. As electronic ballasts are steadily becoming smaller, smarter and more flexible, they are poised to control the market.

Both fluorescent and HID lamp ballast applications will show **improved performance, flexibility and cost advantages** when using **Atmel microcontrollers** over currently available solutions.

## ATMEL LAMP BALLAST MCU OFFERING

### For Non-dimmable Applications

Developed in partnership with a leading fluorescent tube manufacturer, the **AT83EB5114** is a highly integrated and optimized microcontroller designed to drive fluorescent lamp ballasts.



### AT89RFD-10 Ballast Demo Kit

The **AT89RFD-10** is a Non-Dimmable Fluorescent Ballast kit using AT89EB5114 to operate both PFC and lamp inverter control. Complete C code can be updated to implement advanced control and protection algorithm in the micro memory.

#### Main features:

- Universal Input Voltage: 90-256VAC
- Two lamps, type T8, 18W

#### PFC Operation:

- High power factor >0.95
- Low harmonic distortion <10%

### For Dimmable and HID Applications

The **AT90PWM** AVR®-based microcontroller has been specially developed to handle High Intensity Discharge (HID) ballasts and ballasts for dimmable fluorescent lamps.

### ATAVRFBKIT Ballast Demo Kit

The **ATAVRFBKIT** is a Dimmable Fluorescent Ballast kit which demonstrate the ability of the AT90PWM2 to control all the main functions of a DALI Fluorescent Ballast. C code is provided to speed-up development time.

#### Main features:

- Universal Input Voltage: 90-256VAC
- Two lamps, type T8, 18W

#### PFC Operation:

- High power factor >0.95
- Low harmonic distortion < 10%
- Low standby power <600mW

#### Dimming controls:

- DALI
- 0-10V analogue
- One Touch "Swiss" control

The AT83EB5114 and AT90PWM ICs offer in a single package all the features needed in a linear or dimmable fluorescent tube ballast, as well as in a HID ballast. They enable lighting products with increased performance and efficiency, resulting in cost benefits and efficient housing.

**Embedded EEPROM**

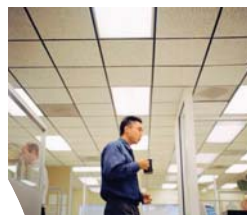
- Stores the tube wattages and parameters
- Allows for tube wattage detection and tube parameter adjustment
- Same ballast can be used for many types of lamp



Vehicle Headlights

**Integrated Power stage Controllers (PSC)**

- Manages Power Factor Correction, ballast control and voltage control.
- Offers a higher resolution mode to the dimmable fluorescent lamp ballast



Lighting of Office Buildings, Schools, Hotels, Hospitals, Factories and Warehouse



**Optimized Analog Blocks**

- 10-bit ADC
- Analog comparator
- Amplifier/Rectifier
- DAC
- 64 MHz PLL for PWM generation



Street and Monument Lighting

**Supports DALI Protocol**

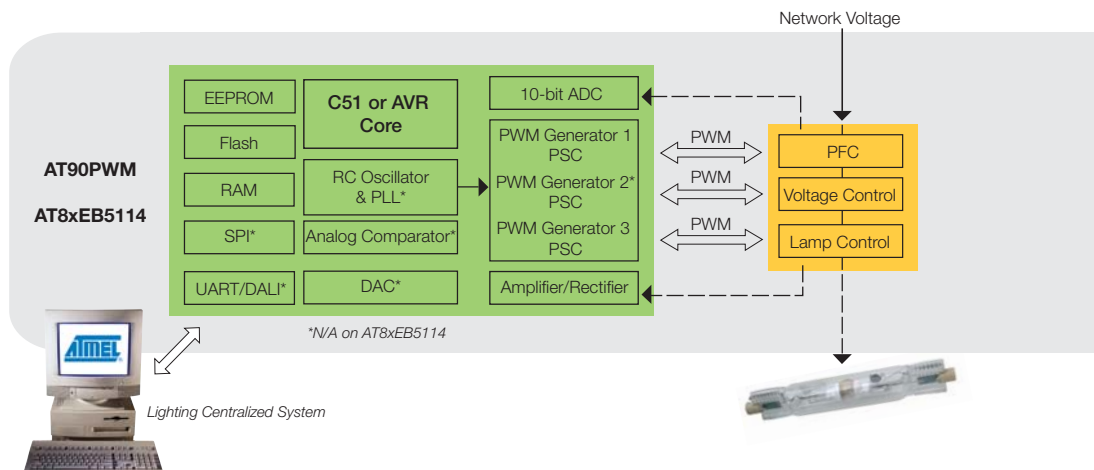
- High energy savings
- Extraordinary flexibility
- User control
- Maintenance benefits



Back Projection Display Systems

**Reduction of Ballast Component Count**

- Factory calibrated RC oscillator, avoiding the use of expensive crystals
- Integrated amplifiers



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**Literature Requests**

[www.atmel.com/literature](http://www.atmel.com/literature)

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Ref.: 4081B-Lighting-04/06/5M



	C51	AVR				
	AT8xEB5114	AT90PWM1	AT90PWM2	AT90PWM3	AT90PWM216	AT90PWM316
<b>Memory</b>						
Flash (KB)	4 or 4	8	8	8	16	16
ROM (KB)	4	-	-	-	-	-
EEPROM (bytes)	256	512	512	512	1024	1024
RAM (bytes)	256	512	512	512	1024	1024
<b>In-system Programming Capability</b>						
	Yes	SPI Self programming	SPI Self programming	SPI Self programming	SPI Self programming	SPI Self programming
<b>On-chip Peripherals</b>						
PWM Generators (8-bit/12-bit/16-bit)	2/-/2	1/2/1	1/2/1	1/3/1	1/2/1	1/3/1
PWM Channels	4	7	7	10	7	10
10-bit ADC	6-channel	8-channel	8-channel	11-channel	8-channel	11-channel
Analog Comparator	-	2	2	3	2	3
Amplifier	Yes	Yes	Yes	Yes	Yes	Yes
10-bit DAC	-	-	-	Yes	-	Yes
Temperature Sensor	-	-	-	-	Yes	Yes
DALI/UART	-	-	DALI/UART	DALI/UART	DALI/UART	DALI/UART
SPI	-	Yes	Yes	Yes	Yes	Yes
RC Oscillators	2	2	2	2	2	2
PLL	-	64 MHz	64 MHz	64 MHz	64 MHz	64 MHz
<b>Available Versions</b>						
Power Supply (V)	3.0 - 3.6	2.7 - 5.5	2.7 - 5.5	2.7 - 5.5	2.7 - 5.5	2.7 - 5.5
Temperature (°C)	-40/+85	-40/+105	-40/+105	-40/+105	-40/+105	-40/+105
Packages	SO20	SO24	SO24	SO32 MLF/QFN32	SO24	SO32 MLF/QFN32
Availability	Now	3Q/2006	Now	Now	end 2006	end 2006
<b>Applications</b>						
	Fluo. Tube	Low-end HID lamp Dim. Fluo. Lamp	Dim. Fluo. Lamp HID Lamp DALI Control box	High-end Dim. Fluo. Lamp HID Lamp	Dim. Fluo. Lamp HID Lamp DALI Control box	High-end Dim. Fluo. Lamp HID Lamp

**Development Tools**

A complete development package is available to help designers develop their new applications. It includes evaluation and debug tools.

<b>AT90PWMx</b>	STK®500 Starter Kit, STK520 Expansion Module, JTAGICE mkII Emulator, DALI Controlled Dimmable Fluorescent demo-kit (ATAVRFBKIT)
<b>AT8xEB5114</b>	Non Dimmable Fluorescent demo-kit (AT89RFD-10) Third party Emulators, Compilers and Programmers.

**Support** [avr@atmel.com](mailto:avr@atmel.com)