

SILICA Lighting – Your Solution Partner.

Direct AC LED technology the future of LED lighting

Acrich3
Semiconductor EcoLight



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LED EVENT 2015

Design en engineering trends voor
LED applicaties

ELEWIJT CENTER
ELEWIJT-ZEMST, BELGIË

WOENSDAG 2 december 2015

SILICA PORTFOLIO



LED Products

Power Supplies

Optics

Connectivity & Holders

Thermal Mgmt.



Agenda

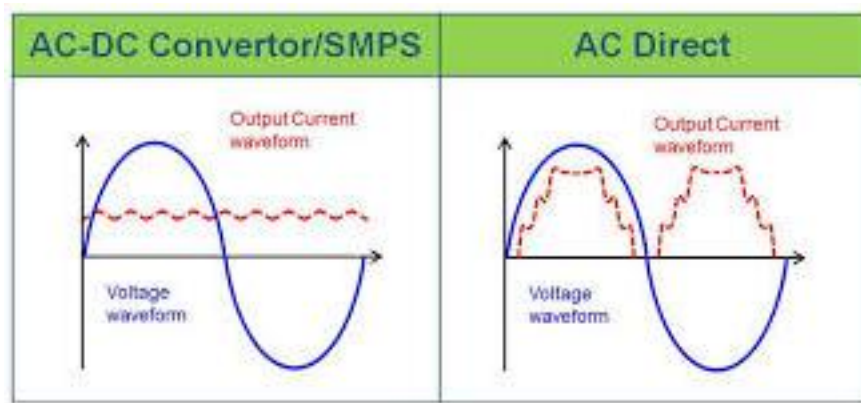
1. Transforming the AC mains voltage in something that LEDs can use
2. History of SSC direct AC technology
3. Basic working principles of AC direct driven technology
4. Improvements that are bringing AC direct to mass market
5. Why AC direct technology will take the market ?
6. What is happening in the market with the AC direct technology ?
7. Examples of what you can do with AC direct technology

Transforming AC line voltage to drive LEDs

- Basic idea of SSC is to **change the way we drive LEDs** and get rid of using typical SMPS (switch mode power supplies)
- SSC proposal is to use a system that is based in a **sequential mode driver for LEDs** following the mains voltage sinusoidal wave

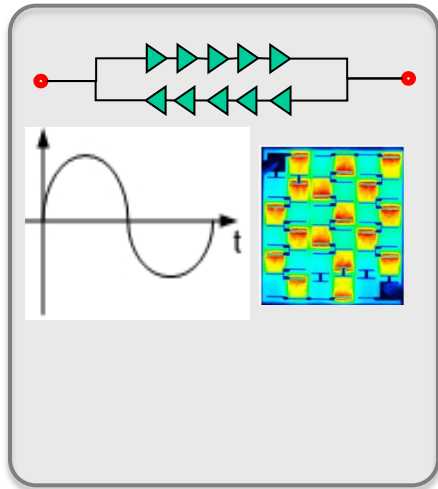


Basic working principle



History of Seoul Semiconductor Acrich Technology

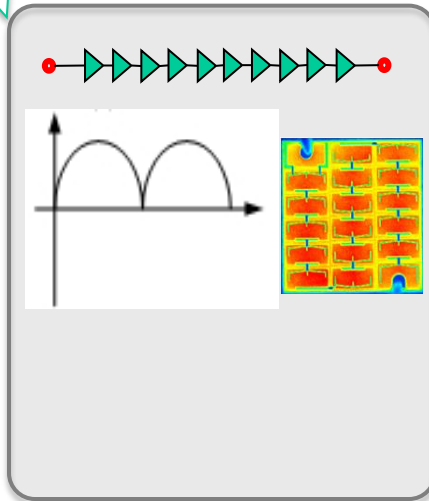
Opto-electrical
Efficiency: 50%



Anti Parallel

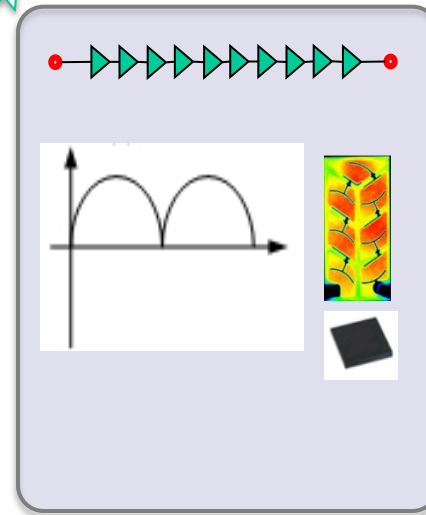
Acrich LEDs 220Vf

Opto-electrical
Efficiency: 65%



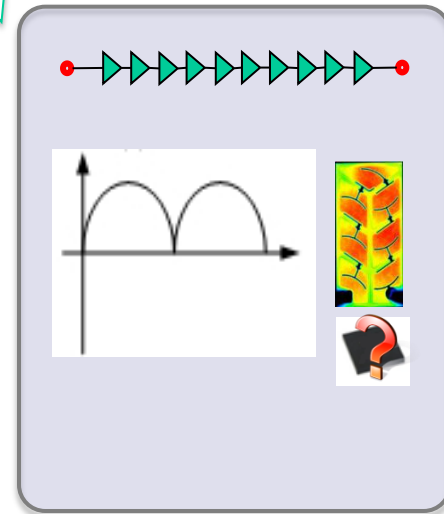
**One direction
LEDs
+
Bridge Diode**

Opto-electrical
Efficiency: 75%



**IC Based
LED System
Acrich
Acrich 2**

Opto-electrical
Efficiency: 85%



**IC Advanced
LED System
Acrich 2.5
Acrich 3.0
Acrich 4.0 ??**

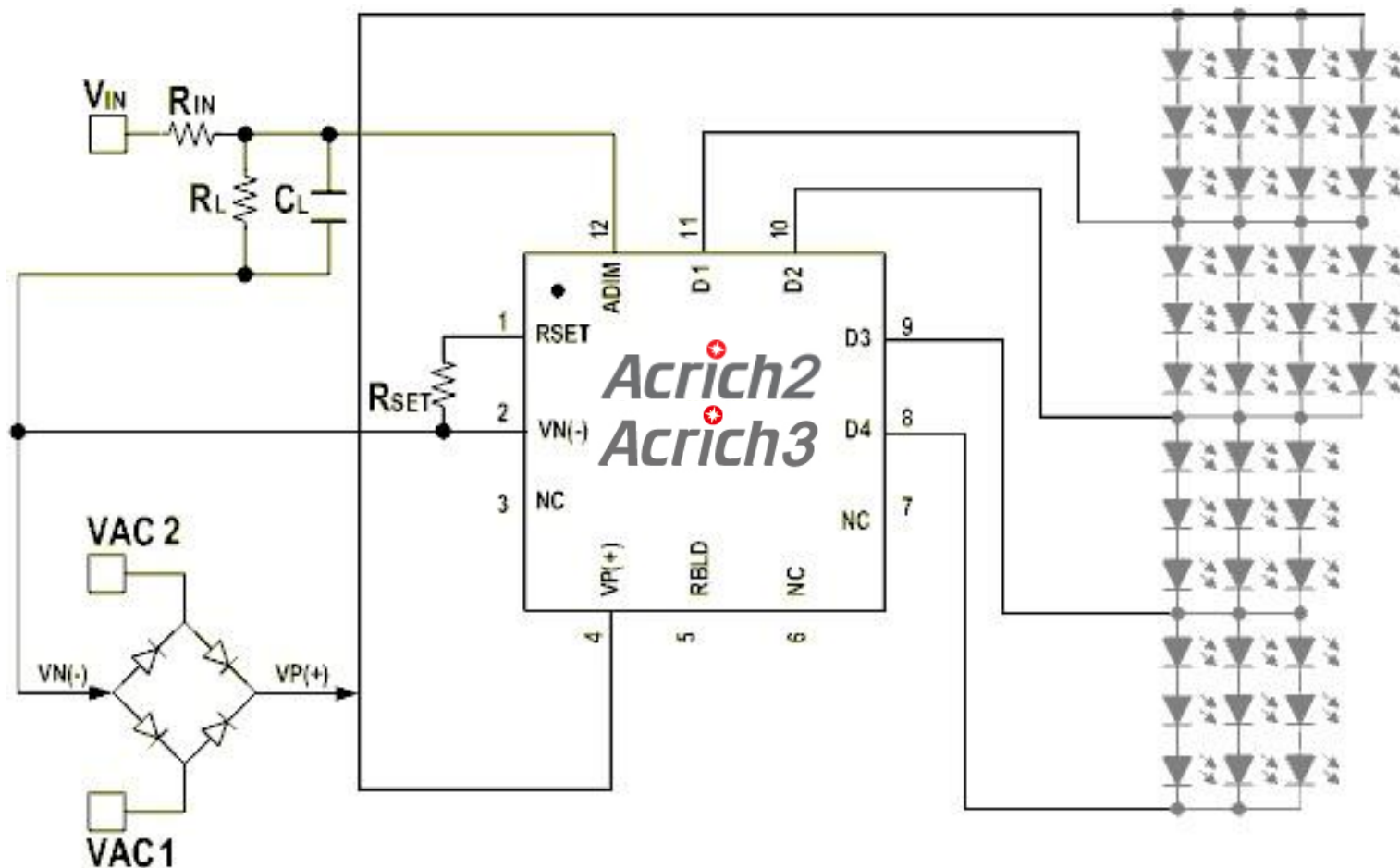
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Basic Acrich working system



Basic Acrich working system

LEDs are divided to 4 Groups, and there are 5 different Stages of operation:

Stage0 = LEDs OFF

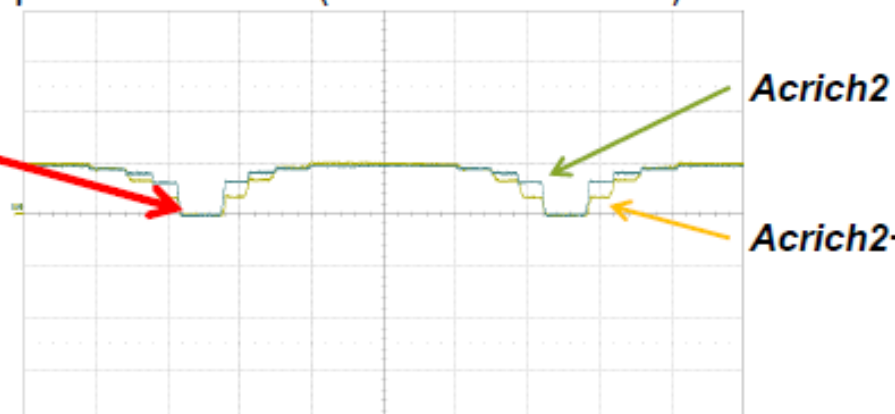
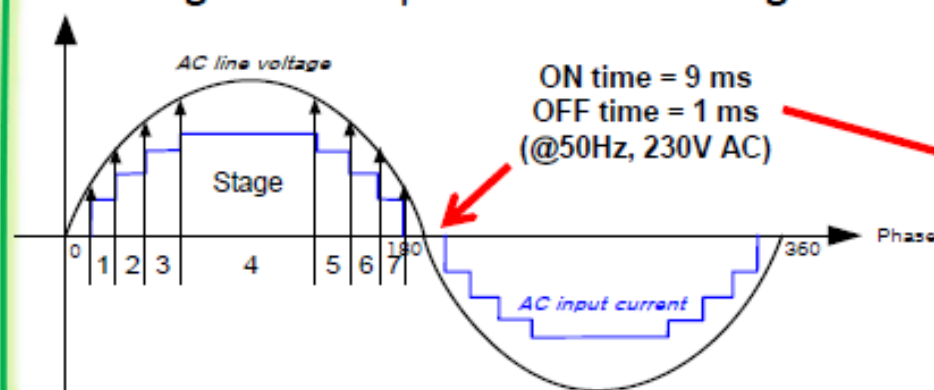
Stage1 = Group 1

Stage2 = Group 1+2

Stage3 = Group 1+2+3

Stage4 = Group 1+2+3+4

(see details below)



1. Voltage (**Black**) and Current (**Blue**) of the **Acrich2+** module. Stages are visible

2. Light output of the **Acrich2/2+/3** modules.

Stage →	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	5 (=3)	6 (=2)	7 (=1)	8 (=0)
Group 1	OFF	ON	ON	ON	ON	ON	ON	ON	OFF
Group 2	OFF	OFF	ON	ON	ON	ON	ON	OFF	OFF
Group 3	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
Group 4	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF

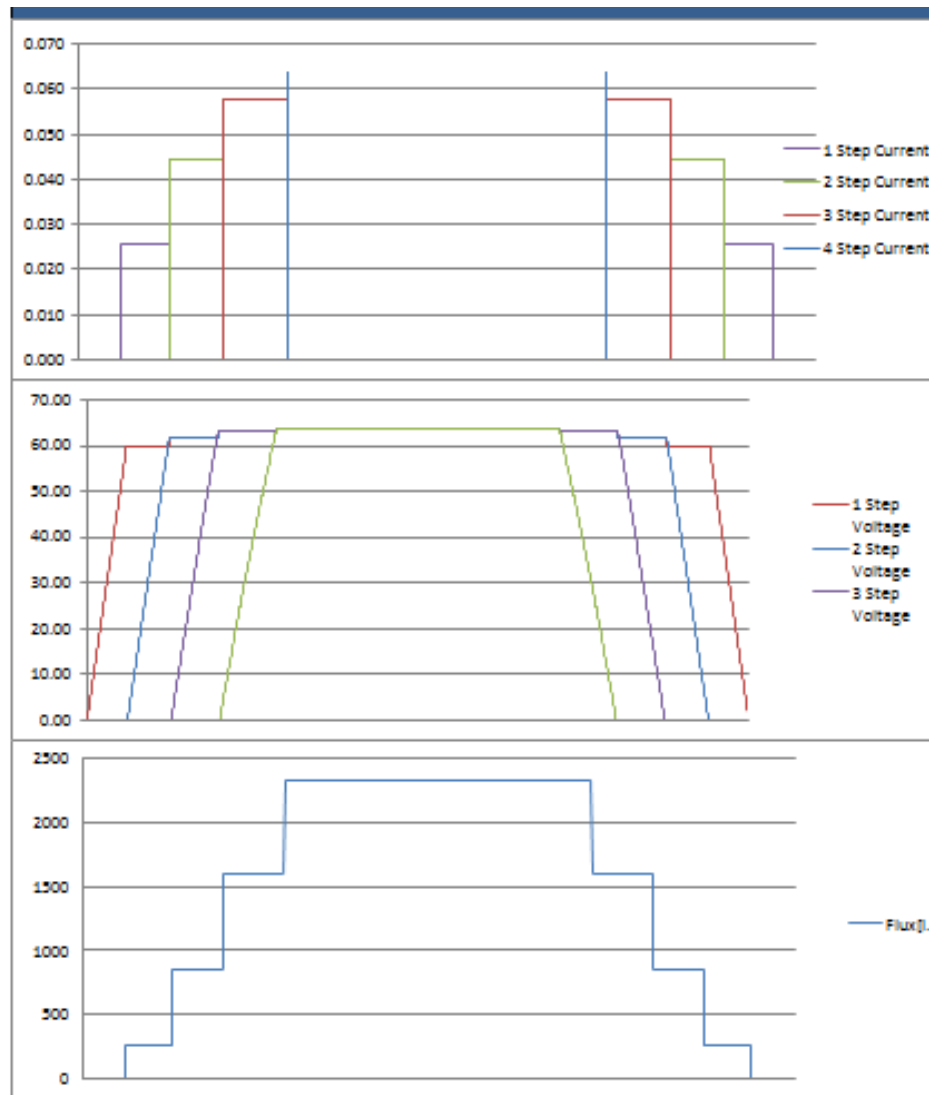
Basic Acrich working system

Acrich 3.0 Module Simulator

1) Design			Product Name				
No	Item	Unit	Value				PKG current
1	Input Voltage	V	230				
2	Input Freq.	Hz	50				
3	1 Step LED array's	ea	series	3	parallel	3	17.08
	2 Step LED array's	ea	series	3	parallel	3	16.80
	3 Step LED array's	ea	series	3	parallel	3	15.82
	4 Step LED array's	ea	series	3	parallel	3	13.71
4	R-set	Ω	5000				LED TOTAL 36 EA
5	IC type	B type <input type="button" value="v"/>					
6	PKG type	P/N	SAW8KG0B[5630 7Ce <input type="button" value="v"/>	lv rank	J0 [60.95] <input type="button" value="v"/>	Vf rank	A [21.1] <input type="button" value="v"/>

2) Module Specification				
No	Item	Unit	Typ	Target
1	Power Consumption	W	12.011	
2	Luminous Flux	lm	1386.22	
3	Acrich Module Efficacy	lm/W	115.41	
4	Power Factor	PF	0.989	
5	Circuit Efficacy	%	84.72%	

Basic Acrich working system



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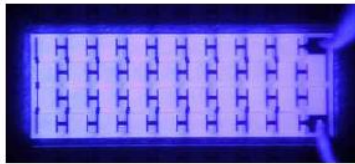
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Bringing Acrich to mass market

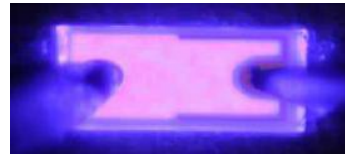
Key improvement factors to bring Acrich systems to mass market

1. Development of the **Multi Junction Technology** LEDs Patented by SSC in 2007



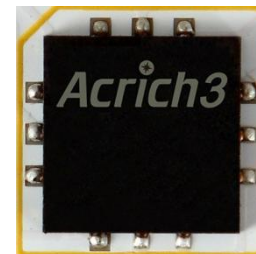
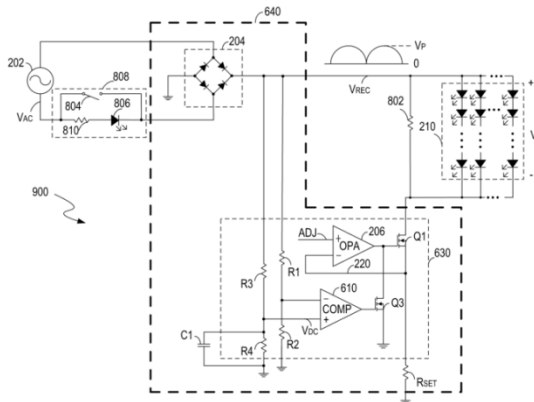
MJT LED

Example with
 $21 \text{ cells} \times 3V_f = 63V_f$



Typical DC LED
 $1 \text{ cell} \times 3V_f = 3V_f$

2. **External IC (ACRICH)** with sequential driving technology patented by SSC in 2010, in 2015 SSC launched the 3rd generation to the market, targeting the smart lighting future products.

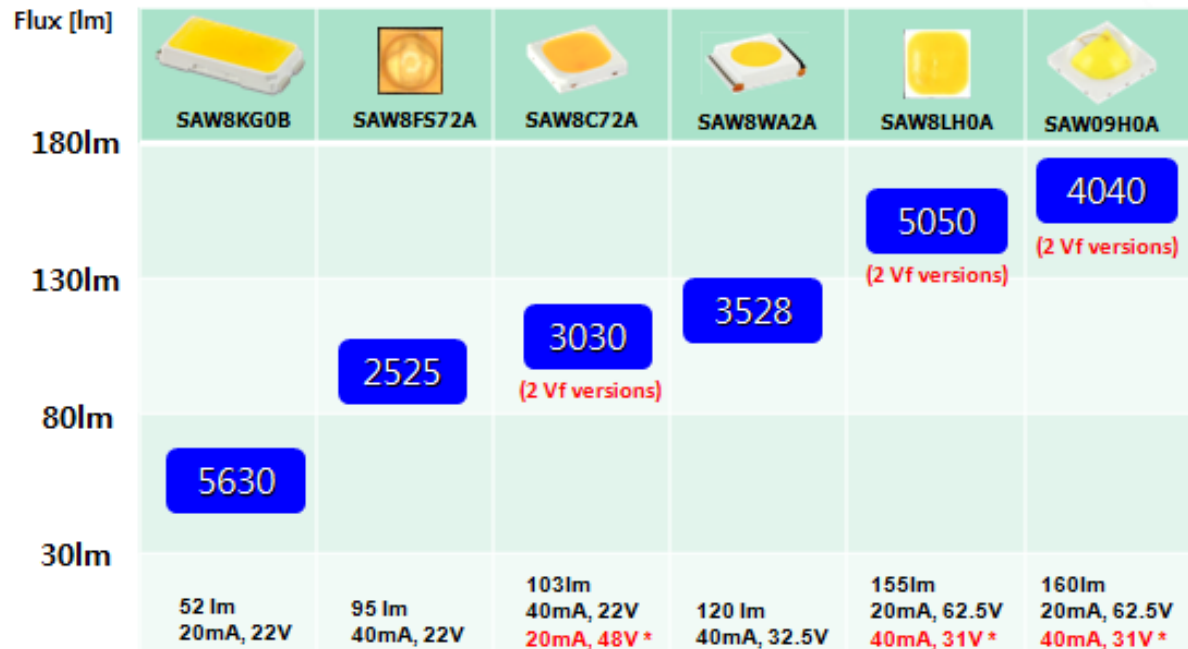


Bringing Acrich to mass market

Key improvement factors to bring Acrich systems to mass market

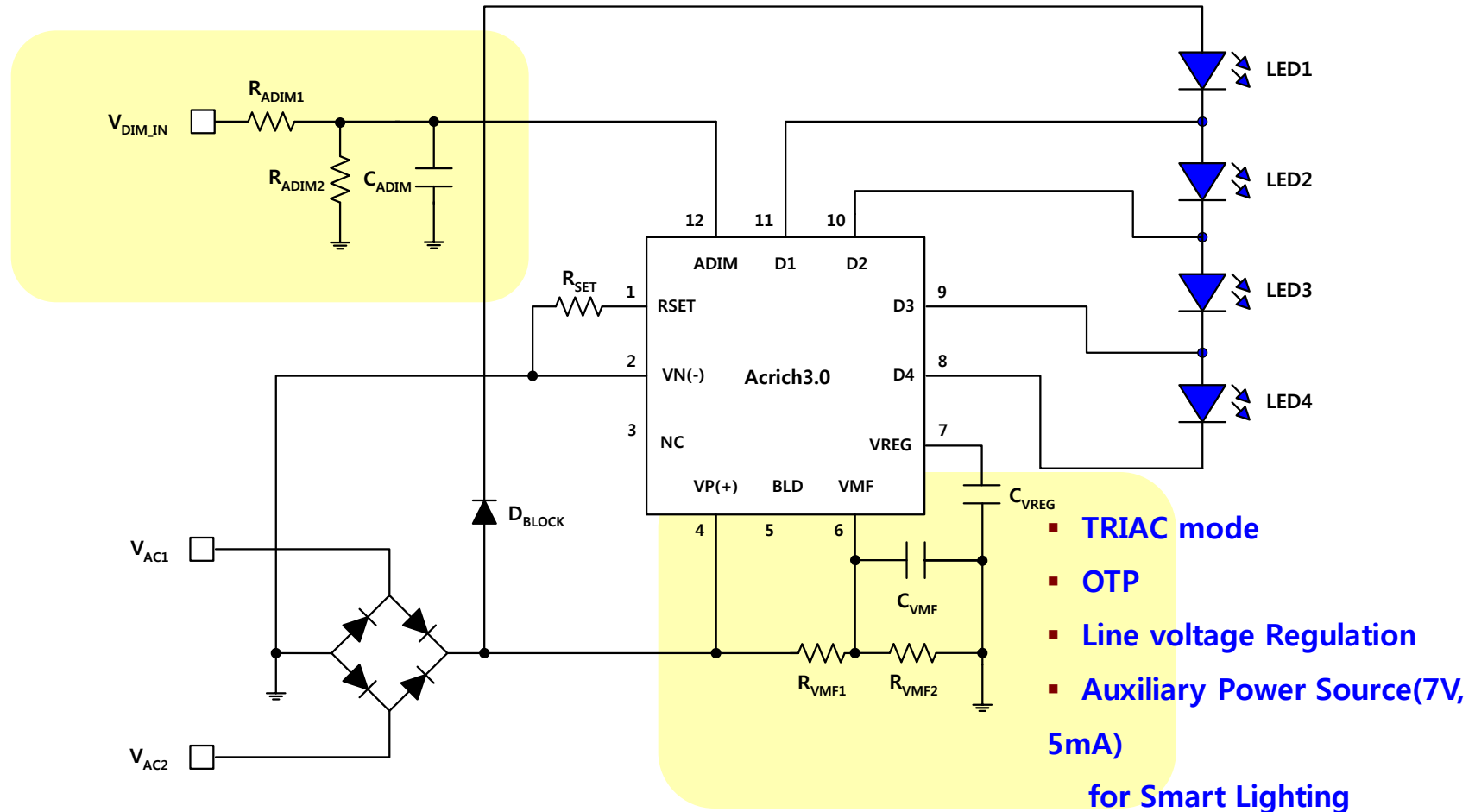
3. In 2015 the LED MJT5630 reached **160 lm/w efficiency** making highest efficiency in the market for a high voltage LED with **22Vf** and **20mA**

4. **Extended Vf range and size** of MJT LED solutions to be able to build any project



2. Benefits from Acrich Module

Acrich 3.0 Improved Function



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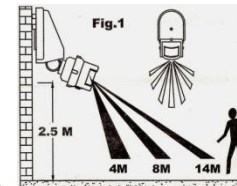
Bringing Acrich to mass market

7. Flexibility of the Acrich 3.0 system

Controllers



Autonomous systems - Sensors



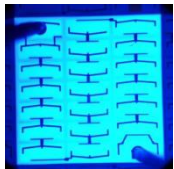
Movement sensor
Lighting sensor
Noise sensor
Magnetic sensor
...

Acrich3
Semiconductor EcoLight

Electrical solutions

PF > 0.95
AC/DC
Output 7V 5mA
FLICKER
FREE
Power
Compensation
Thermal
security
Low THD

LED



MJT LEDs for best
compact solutions

Design freedom

Reduced mechanic parts

Low cost than
DC solution

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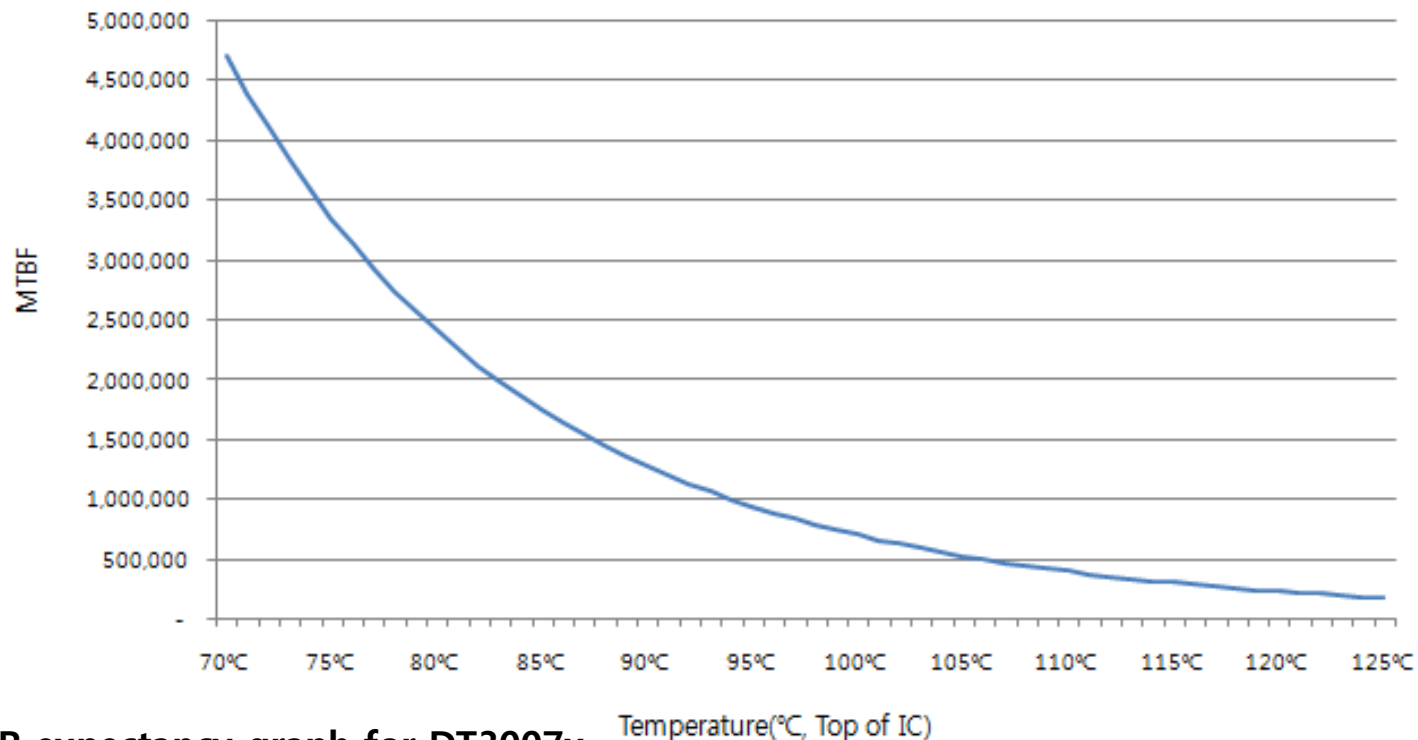
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Bringing Acrich to mass market

Key improvement factors to bring Acrich systems to mass market

6. Longer lifetime of Acrich system compared with a SMPS driver



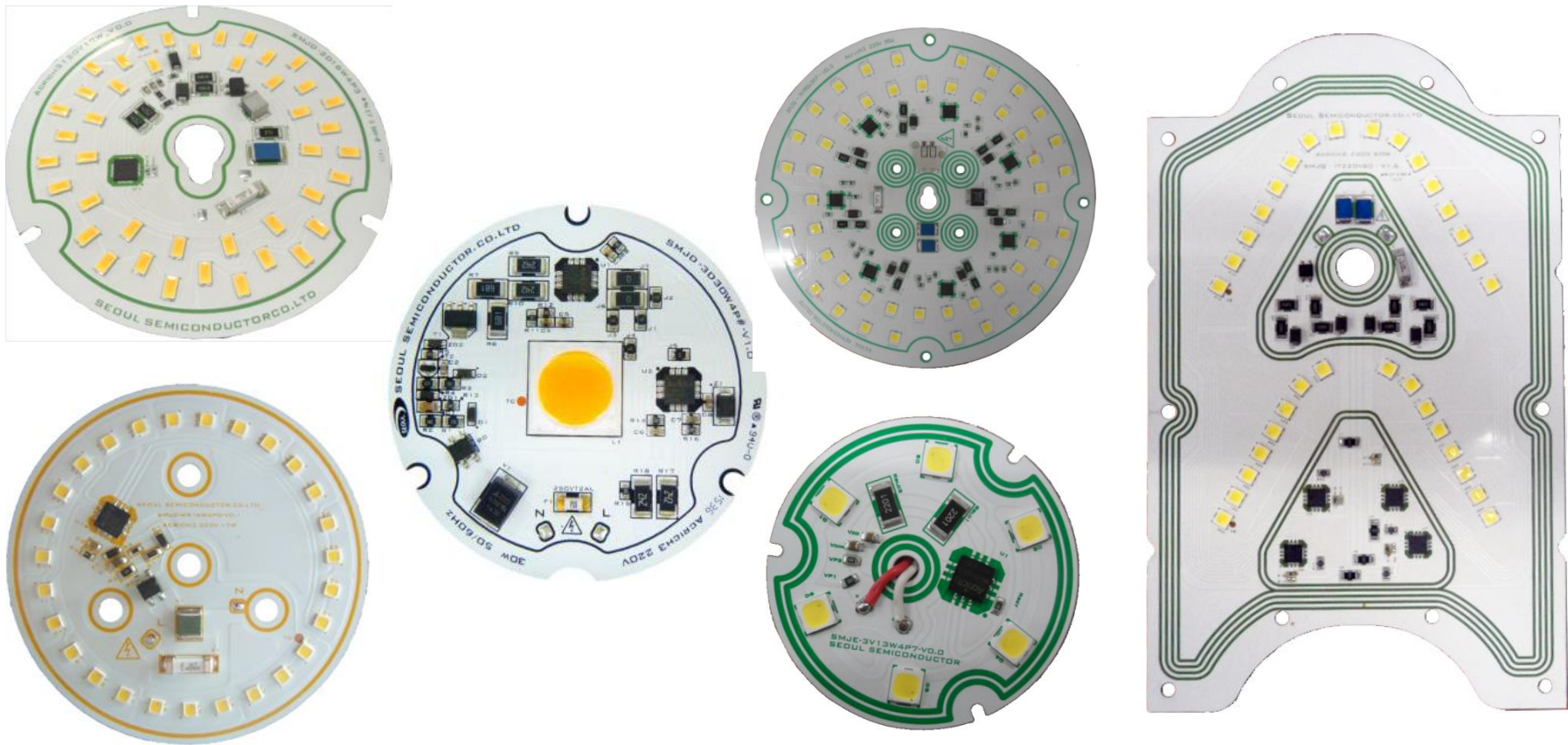
■ ELFR expectancy graph for DT3007x

- By MTBF (Mean time between failure) and Temperature (°C)

Bringing Acrich to mass market

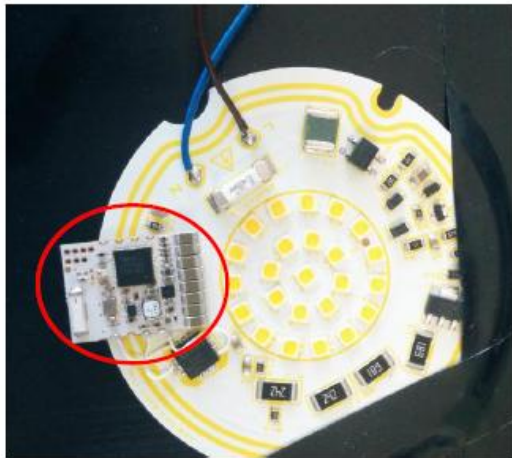
Key improvement factors to bring Acrich systems to mass market

5. Small factor and all integrated modules with Acrich technology



Bringing Acrich to mass market

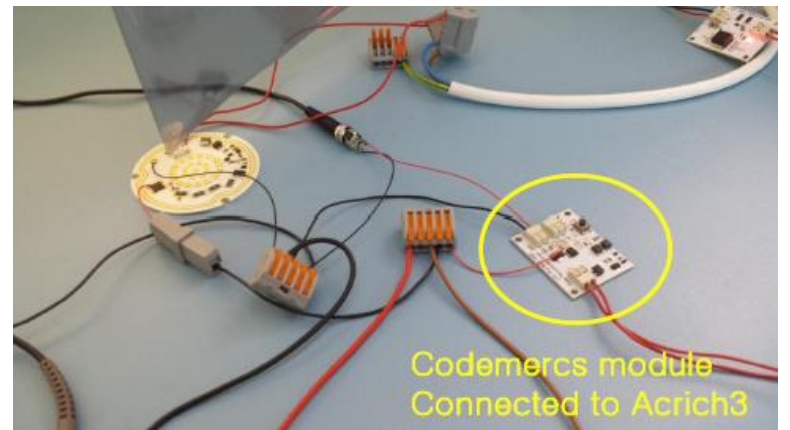
8. Smart solutions with Acrich 3.0 system (BLE, DALI, 0-10V, PWM, sensors...)



Casambi module
Connected to Acrich3



DPEdesign module
Connected to Acrich3



Codemercs module
Connected to Acrich3

Why AC direct technology will take the market ?

1. Small form factor compared with a SMPS for the same power
2. All on board system → LED + Driver + Controller → all in one PCB
3. Lifetime of the system is based on LED lifetime, the driver is no more the weakest part
4. Fast time to market
5. Reduced system cost
 - Less mechanical parts
 - Easy and fastest assembly
 - Cheaper driving technology
6. Compliant with international regulations
7. Less components compared with a SMPS driver
8. Compatible with an external world of controllers and smart systems

What is happening in the market with AC direct solutions?



▶ PrevaLED Core AC PRO

Spot - Modules pour support mural



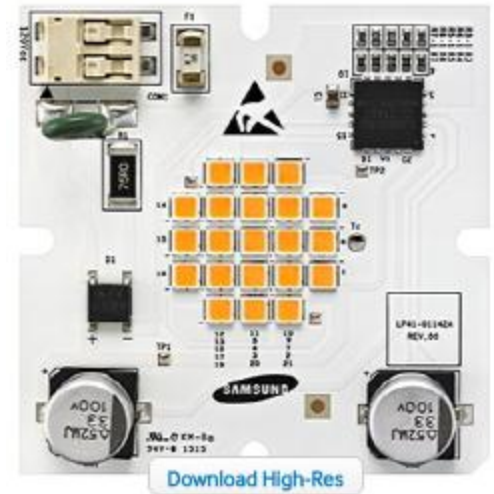
▶ PrevaLED Core AC

Spot - Modules pour support mural

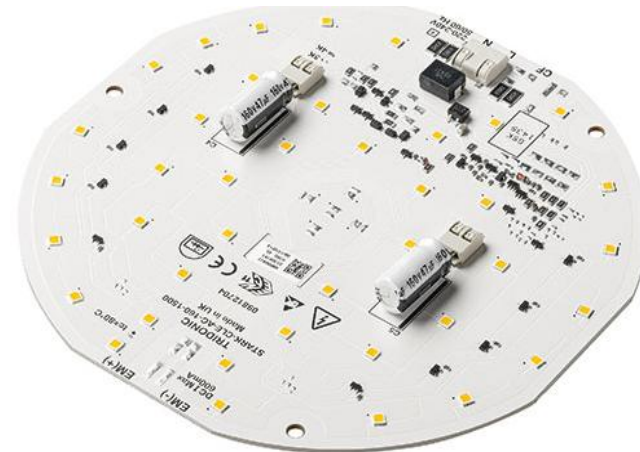
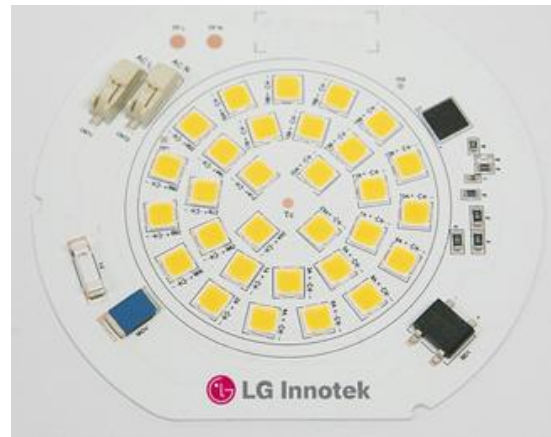
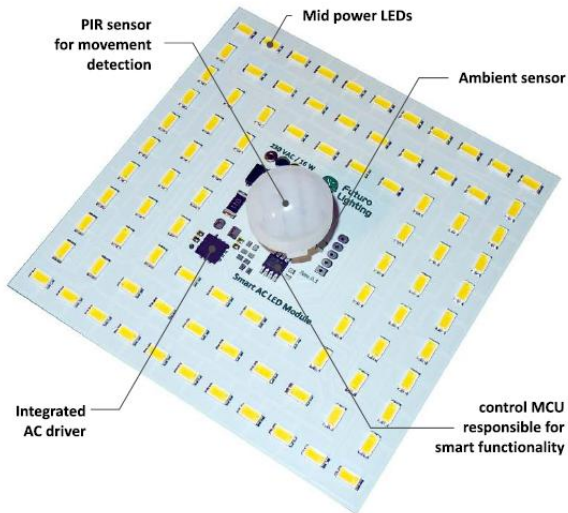


▶ PrevaLED Flat AC Portfolio

Spot-, Down- and Wallmount Light Engines and Modules



ALL big brands are moving into it !!



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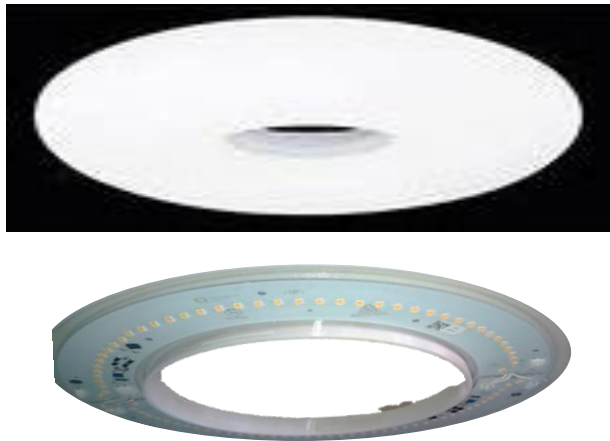
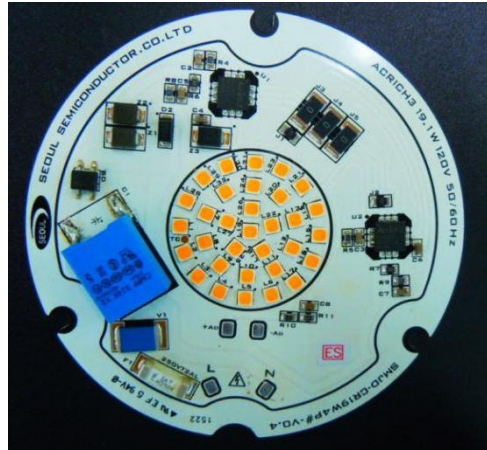
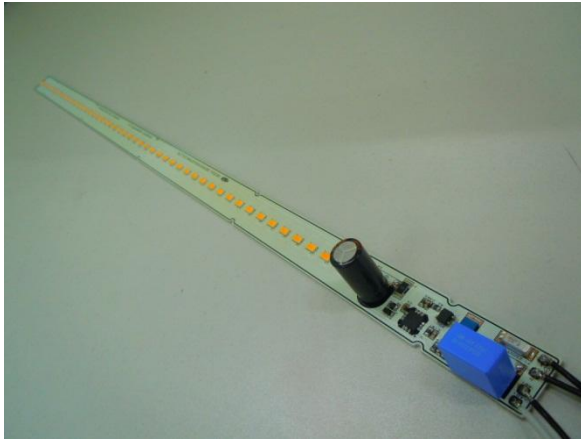
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Examples of AC direct driven products



What can you do with direct AC technology ?

Examples of AC direct driven products



What can you do with direct AC technology ?

THANK YOU

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