

### General Description

This demonstration board utilizes the AL8823 LED driver-controller providing a cost effective solution for offline high brightness MR16/AR111 LED applications. The AL8823 LED driver board has good compatibility with Electronics Transformers (ET). This user-friendly evaluation board provides users with quick connection to their different types of LEDs string. The demonstration board can be modified easily to adjust the LED output current and the number of series connected LEDs that are driven.

A bill of materials is included that describes the parts used on this demonstration board. A schematic and layout have also been included along with measured performance characteristics. These materials can be used as a reference design for your products improving your product's time to market.

### Key Features

1. Good electronic transformer(ET) compatibility
2. High efficiency >82% at 12Vac input voltage
3. High PF >0.9
4. Low THD

### Applications

MR16/AR111 LED Lighting

### Specifications

Parameter	Value
AC Input Voltage	12Vac
Output Power	11.55W
LED Current	350mA
LED Voltage	33V
Power Factor	>0.9
Efficiency	>82 %
Dimension	Φ 47mm
RoHS Compliance	Yes

### Evaluation Board

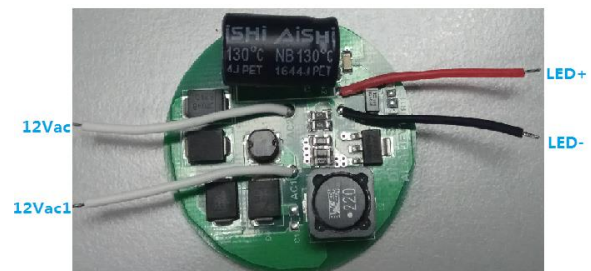


Figure 1: Top View

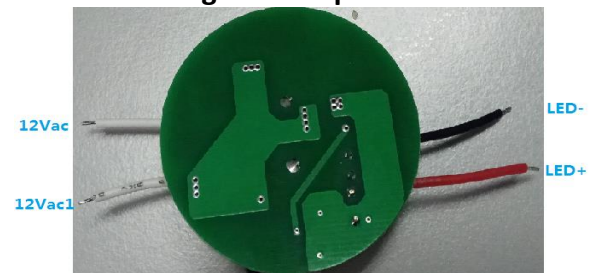
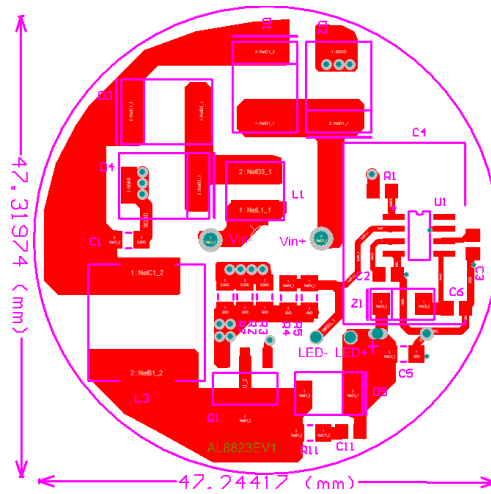


Figure 2: Bottom View

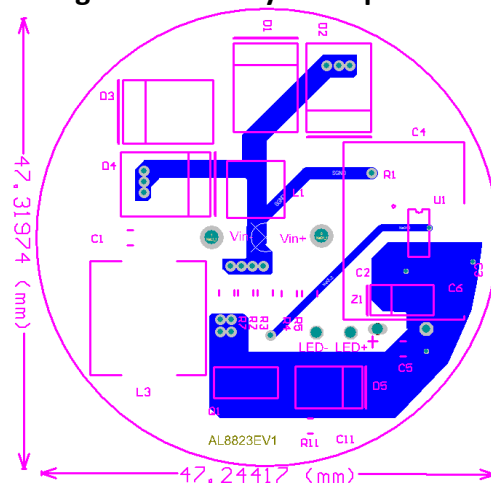
### Connection Instructions:

12VAC Input: White —12Vac  
 12VAC1 Input: White —12Vac  
 DC LED+ Output: L+ (Red)  
 DC LED- Output: L- (Black)

## Board Layout



**Figure 3: PCB Layout Top View**



**Figure 4: PCB Layout Bottom View**

## Quick Start Guide

1. Ensure that the AC source is switched OFF or disconnected.
2. Connect the 12V<sub>ac</sub> AC line wires of power supply to two test points of “12VAC” on the left side of the board.
3. Connect the anode wire of external LED string to LED+ output test point.
4. Connect the cathode wire of external LED string to LED- output test point.
5. Turn on the main switch. LED string should light up.

### Schematic

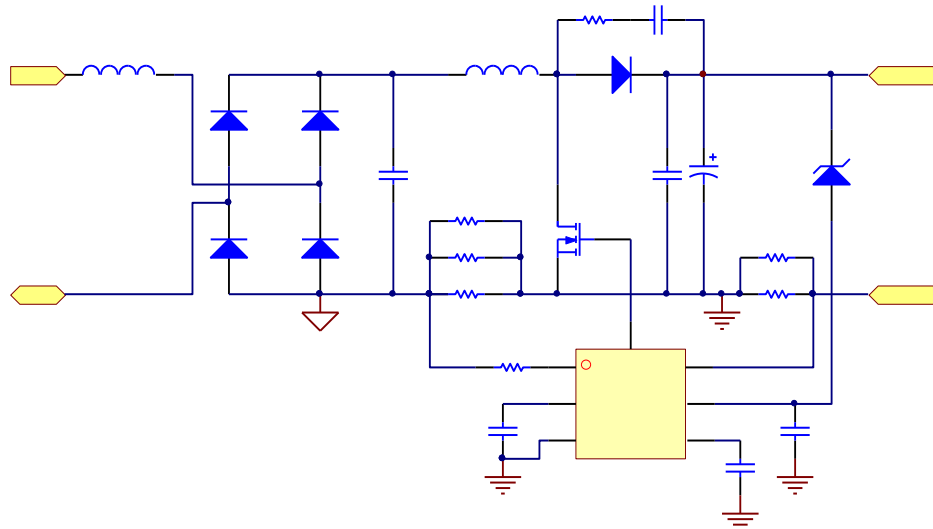


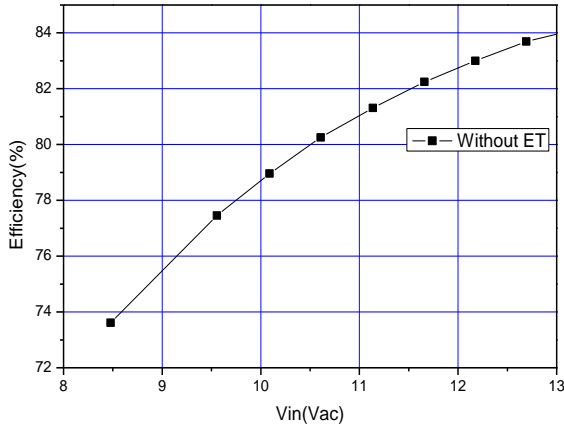
Figure 5: Schematic Circuit

### Bill of Material

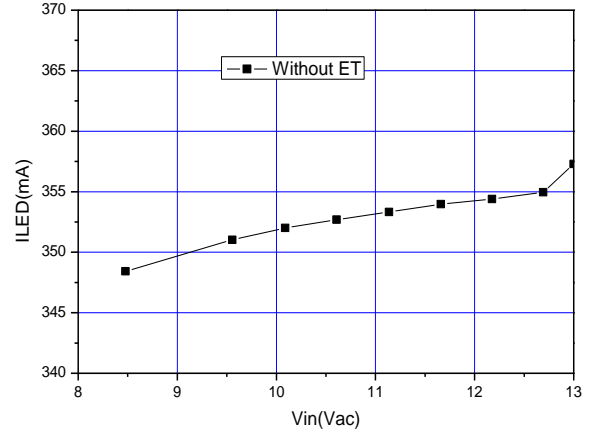
Item	Quantity	Package	Description
C1,C11	0	0805	NC
C2, C3	2	0603	SMD Ceramic Capacitor, 1uF/16V, X7R
C4	1	DIP, 12*20	Electrolytic Capacitor, 560uF/50V, AISHI
C5	1	1206	SMD Ceramic Capacitor, 1uF/50V, X7R
C6	1	0603	SMD Ceramic Capacitor, 330nF/50V, X7R
D1, D2, D3, D4	4	SMC	Schottky Diode, B340, 3A/40V,Diodes Inc
D5	1	SMA	Schottky Diode, B260, 2A/60V,Diodes Inc
L1	1	SMD	Inductor, 2.2uH/4.6A , 5.8x5.2mm, 732774022, Wurth
L3	1	SMD	Inductor, 22uH/4.1A, 12x12mm, 744770122, Wurth
Q1	1	SOT223	MOSFET, DMN6068SE, 4.5A/ 60V, Diodes Inc
R1, R2	2	1206	SMD Resistor,R330, 1%, 1/4W
R3	1	1206	SMD Resistor,R300, 1%, 1/4W
R4	2	1206	SMD Resistor ,1.2R, 1%, 1/4W
R6	1	0603	SMD Resistor,680R, 1%, 1/16W
R7	0	1206	NC
U1	1	SO-8	IC, AL8823, Diodes Inc
Z1	1	SOD-123	Zener Diode, BZT52C3V9, Diodes Inc

**System Performance**

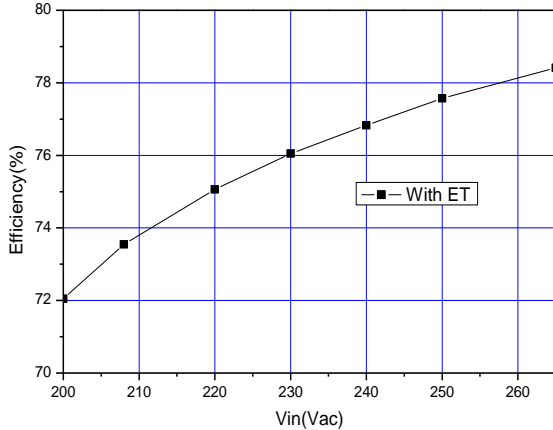
Efficiency vs Input Voltage without ET



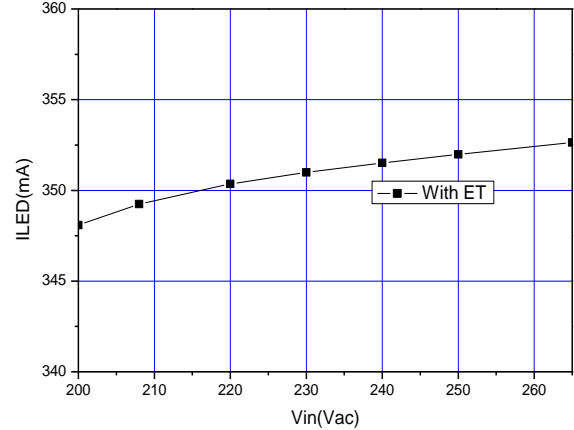
LED current vs Input Voltage without ET



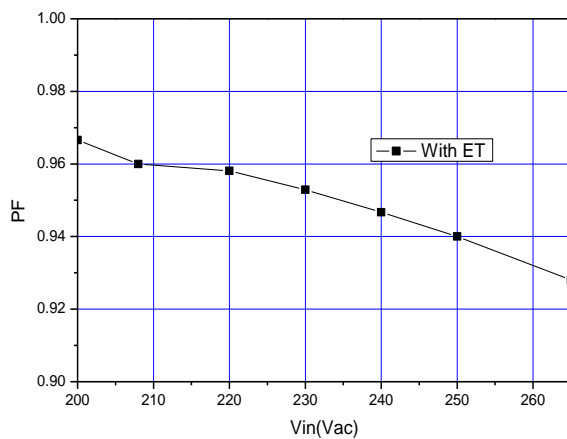
Efficiency vs Input Voltage with ET



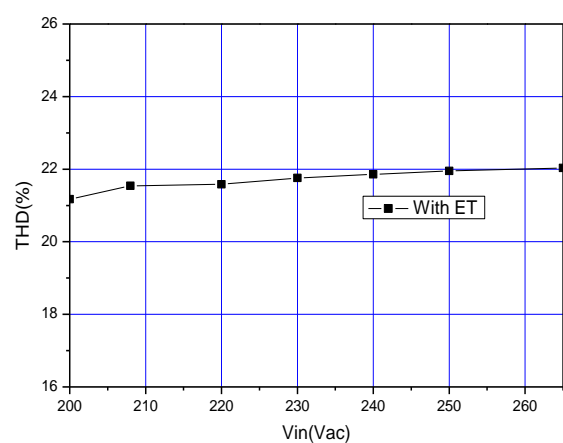
LED current vs Input Voltage with ET



PF vs Input Voltage with ET



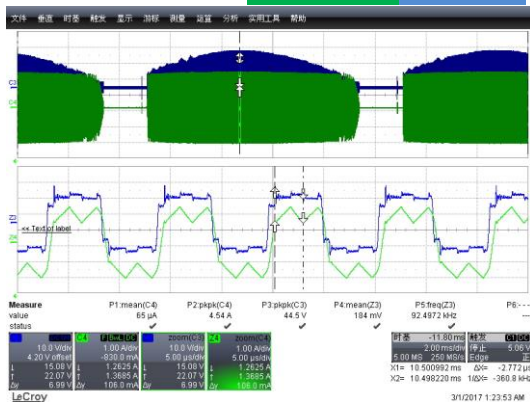
THD vs Input Voltage with ET



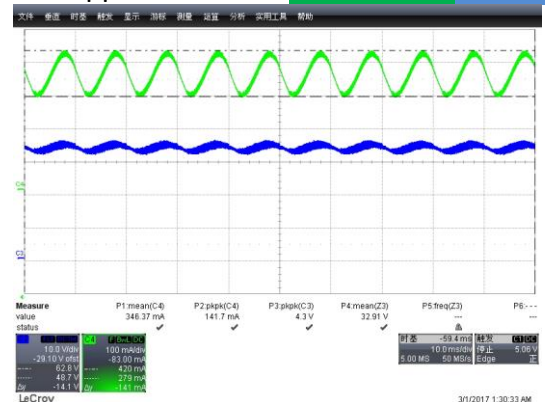
Note: ET stands for electronic transformer Tridonic VIPER

### Functional Waveform

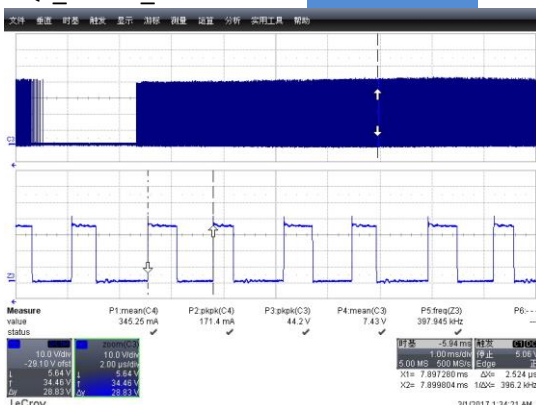
Input Voltage(VET) & Input Current(IET)  
Vin=230V with ET **G-IET** **B-VET**



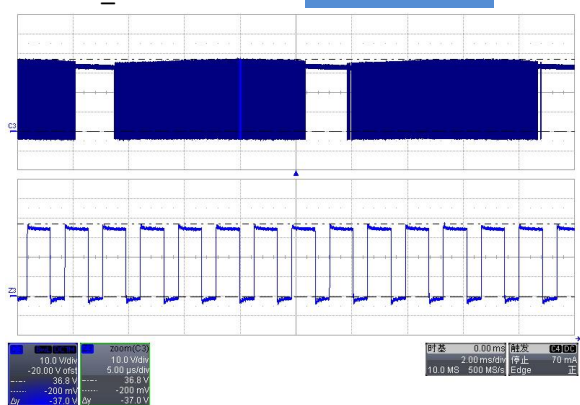
LED Current Ripple & Output voltage@ Vin=230VAC  
with ET Ripple=141mA **G-ILED** **B-VLED**



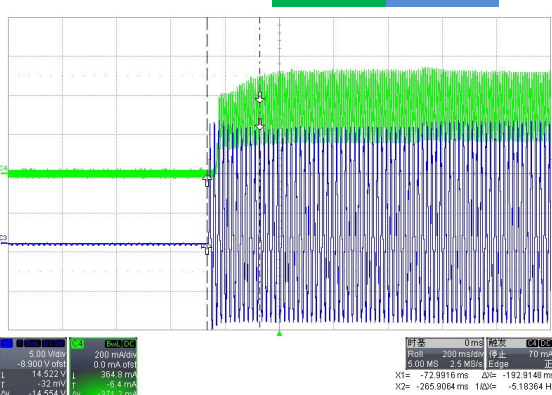
Q1 Drain Waveform Vin=230Vwith ET  
VQ1\_DRAIN\_MAX=36V **B-VDRAIN**



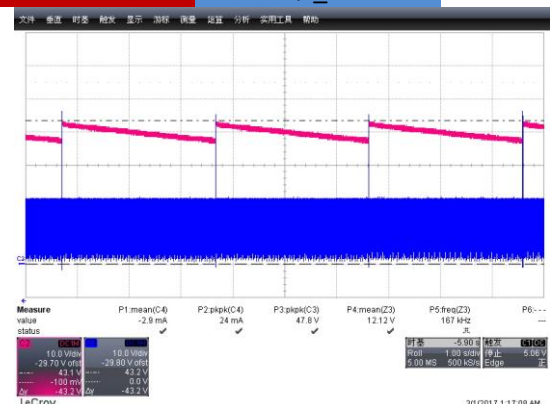
Diode D5 Waveform Vin=230V with ET  
VD5\_MAX=36.8V **B-VD5**



Start time @ Vin=12Vac without ET  
Start time=193ms **G-ILED** **B-Vin**



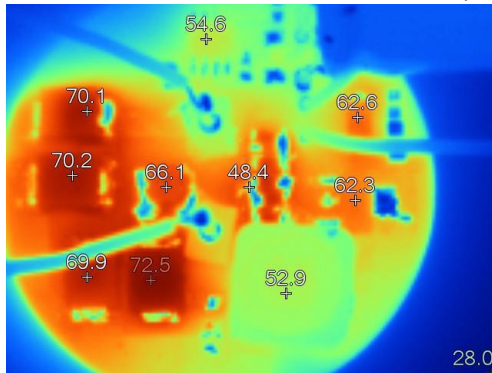
LED Open Protection @ Vin=12Vac without ET  
**R-VLED+** **B-VQ1\_DRAIN**



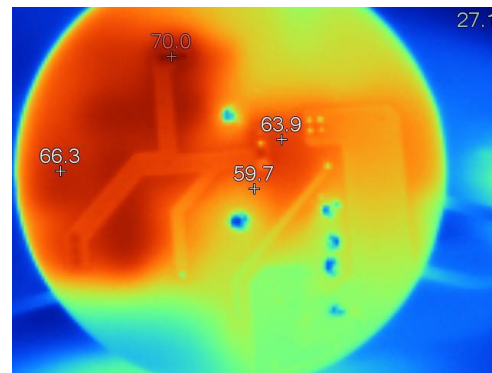
Note: ET stands for electronic transformer Tridonic VIPER;

### Thermal Test

The test is without electronic transformer, and the board burns for 30 minutes.



Top View



Bottom View

### Transformer Compatibility List

#### 1) 230VAC to 12VAC Electronic Transformers

Index	Electronic Transformers (230VAC to 12VAC)		Performance (No Flicker)
	Brand	Model	
1	PHILIPS	ET-E 105(50-105w)	√
2	PHILIPS	Primaline 70 230-240(20-70w)	√
3	SELF	SET105F-2 (35-105W)	√
4	IBL	4104	√
5	YANKON	ET-60E (20-60w)	√
6	TRIDONIC	VIPER 60VA	√
7	ACTEC	MINNI60	√
8	Nelson	MTECOUGAR60	√

#### 2) 120VAC to 12VAC Electronic Transformers

Index	Electronic Transformers (120VAC to 12VAC)		Performance (No Flicker)
	Brand	Model	
1	LIGHTECH	LET75(75W) dimmer	√
2	HATCH	HD105-120	√
3	HATCH	RS12-60M(60W) dimmer	√
4	HATCH	RS12-150(150W)	√
5	HATCH	RS12-30M-LED(30w)	√
6	HATCH	VS12-60W(60W)	√

Note: √ = No Flicker

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