

### General Description

This demonstration board utilizes the AL8822 LED driver-controller providing a cost effective solution for dimmable in offline high brightness LED applications. 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. Dimmable for 230V dimmer
2. Active PFC with power factor >0.9
3. High efficiency >68% with electronic transformer
4. Low THD

### Applications

LED Lighting

### Specifications

Parameter	Value
AC Input Voltage	12Vac
Output Power	5W
LED Current	180mA
LED Voltage	28V
Power Factor	>0.9
Efficiency	>68 %
Dimension	Φ 26.1 mm
RoHS Compliance	Yes

### Evaluation Board

Figure 1: Top View

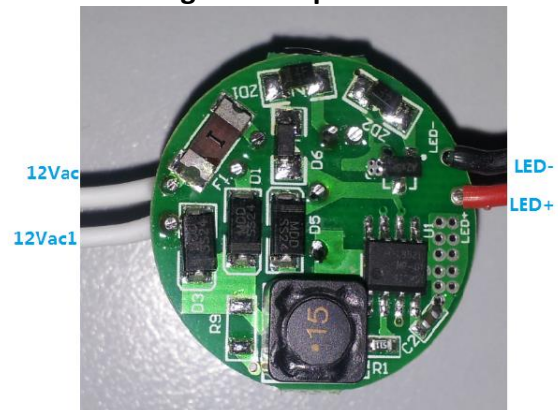


Figure 2: Bottom View



### Connection Instructions:

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

## Board Layout

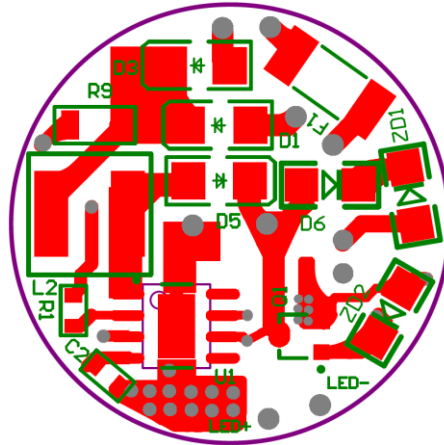


Figure 3: PCB Layout Top View

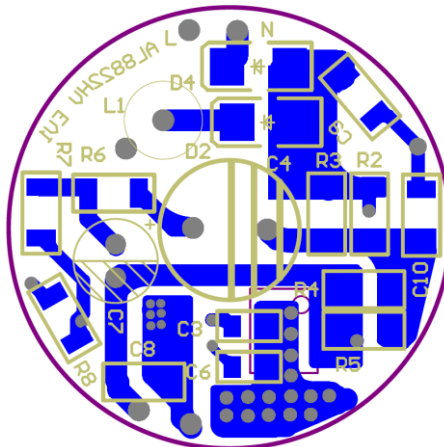


Figure 4: PCB Layout Bottom View

## 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

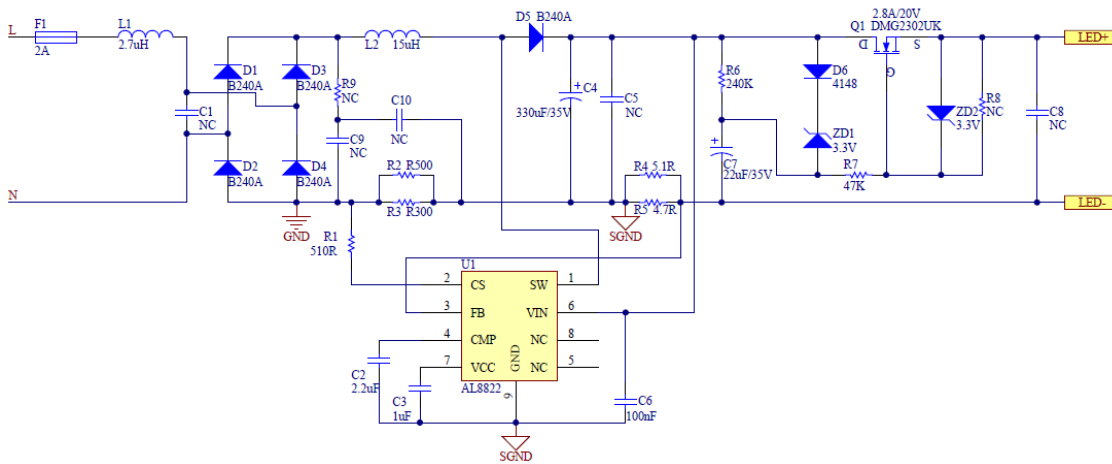
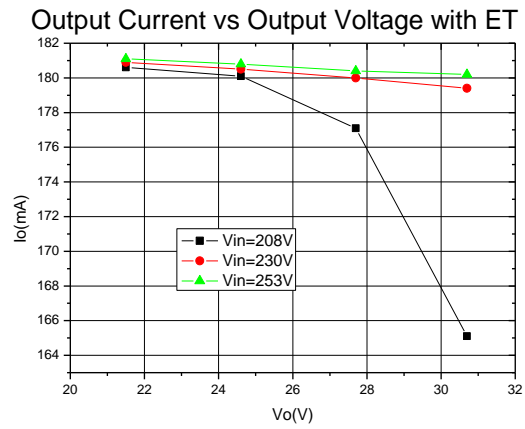
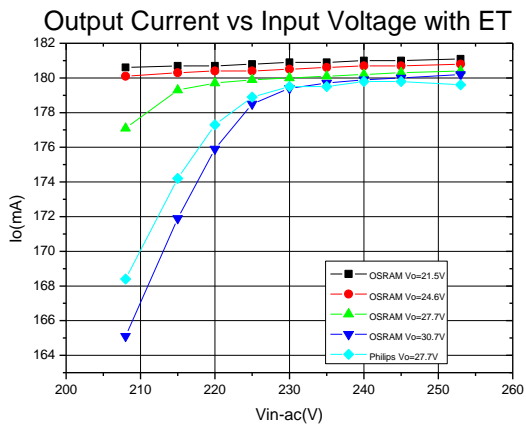
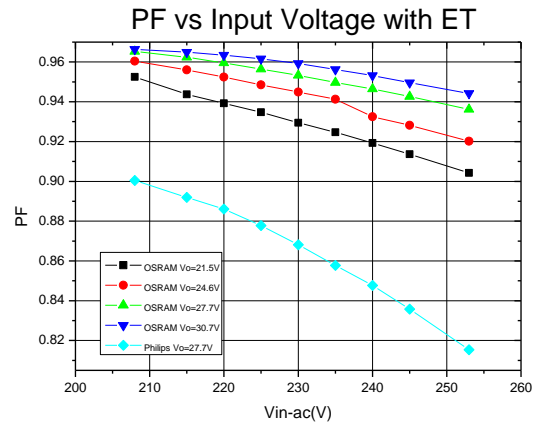
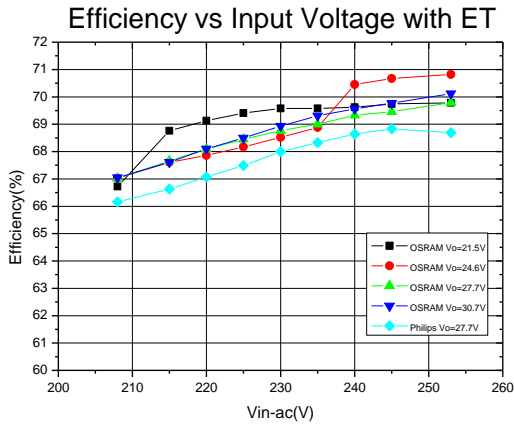


Figure 5: Schematic Circuit

### Bill of Material

Item	Quantity	Package	Description
D1,D2,D3,D4,D5	5	SMA	Schottky Diode, B240A, 2A/40V, Diodes Inc
D6	1	SOD123	Diode, 1N4148, 100V/300mA, Diodes Inc
ZD1,ZD2	2	SOD123	Zener Diode, 3.3V, BZT52C3V3, Diodes Inc
Q1	1	SOT23	MOSFET, DMG2302UK, 2.8A/20V, Diodes Inc
U1	1	SO-8EP	IC, AL8822, Diodes Inc
R1	1	0603	SMD Resistor, 510R, 5%, 1/16W
R2	1	1206	SMD Resistor, R500, 1%, 1/4W
R3	1	1206	SMD Resistor, R300, 1%, 1/4W
R4	1	1206	SMD Resistor, 5R1, 1%, 1/4W
R5	1	1206	SMD Resistor, 4R7, 1%, 1/4W
R6	1	1206	SMD Resistor, 240K, 5%, 1/4W
R7	1	1206	SMD Resistor, 47K, 5%, 1/4W
R8,R9	0	1206	NC
C2	1	0805	SMD Ceramic Capacitor, 2.2uF/25V
C3	1	0805	SMD Ceramic Capacitor, 1uF/25V, X7R
C4	1	DIP, 8*10	Electrolytic Capacitor, 330uF/35V, LKF series, YMIN
C6	1	0805	SMD Ceramic Capacitor, 100nF/50V, X7R
C7	1	DIP, 5*7	Electrolytic Capacitor, 22uF/35V, LKG series, YMIN
C8,C9	0	1206	NC
L1	1	DIP, 0410	Color-ring Inductor, 2.7uH, 0410
L2	1	SMD	SMD Inductor, 15uH/1.1A, 6.8x6.8mm,744062150, Wurth
F1	1	2410	Fuse, 250VAC/2A, MF2410F2.000TM, AEM

### System Performance



Note: ET stands for Electronic Transformer.

### Bench Test Waveform

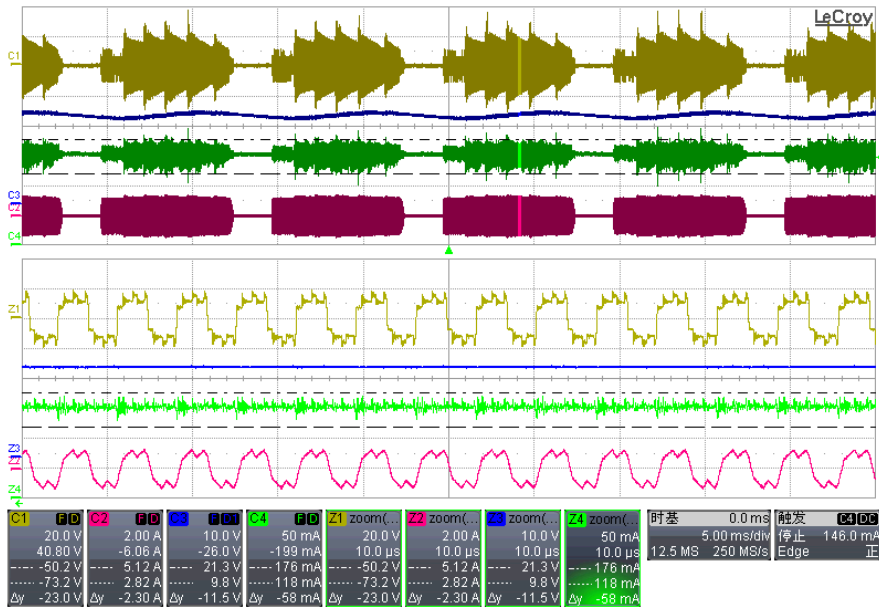
For 230VAC dimmable MR16 design bench testing, the electronic transformer type is OSRAM HTM 70/230-240. The dimmer type is GUNG (leading edge Dimmer) and Busch 6513 U-102 (Trailing edge Dimmer).

Following is a block diagram of the bench circuit that indicates voltage and current designations where the scope plots are functionally captured on the bench set-up. The bench set-up is used in the evaluation of the AL8822EV1 module dimmable MR16 design.



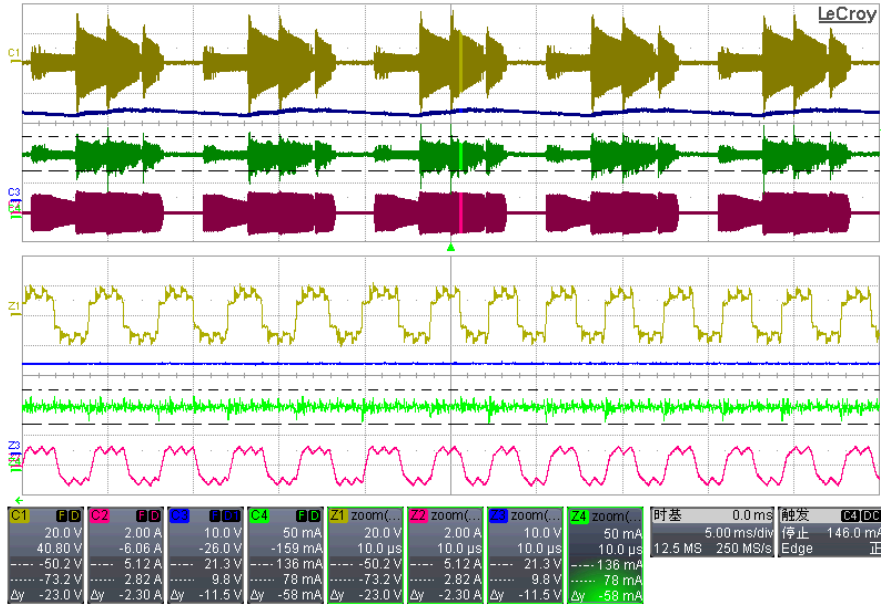
### Waveform #1 – Maximum Dimming with dimmer GUNG =>I4=179.5mA

(Channel 1:V2; Channel 2: I2; Channel 3:V3; Channel4: I4)



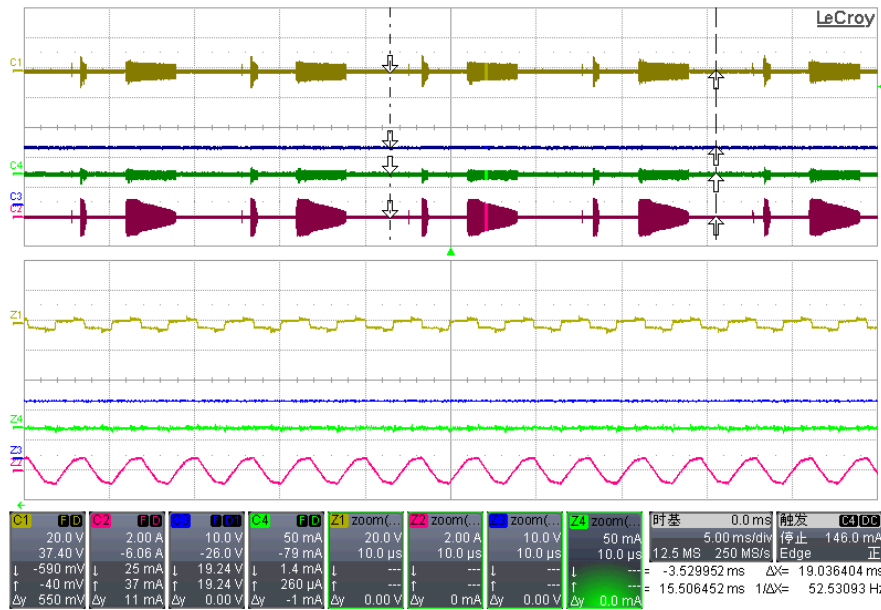
### Waveform #2 – Middle Dimming with dimmer GUNG =>I4=107mA

(Channel 1:V2; Channel 2: I2; Channel 3:V3; Channel4: I4)



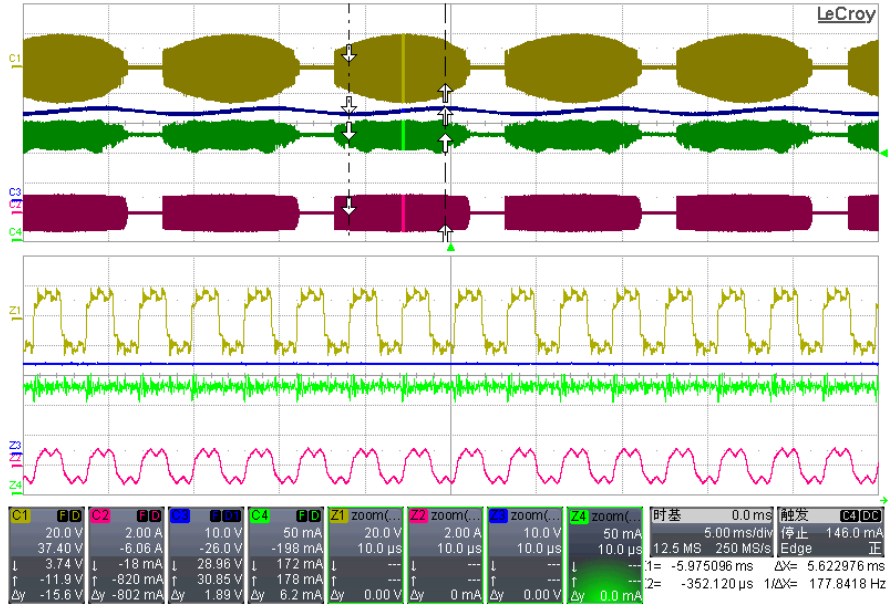
**Waveform #3** – Minimum Dimming with dimmer GUNG =>I4=0mA

(Channel 1:V2; Channel 2: I2; Channel 3:V3; Channel4: I4)

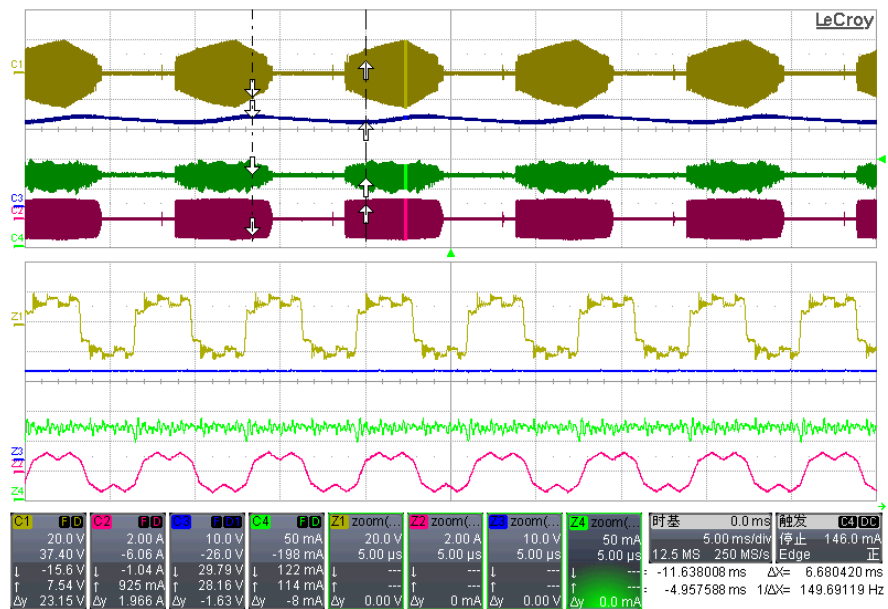


**Waveform #4** – Maximum Dimming with dimmer BUSH=>I4=179.5mA

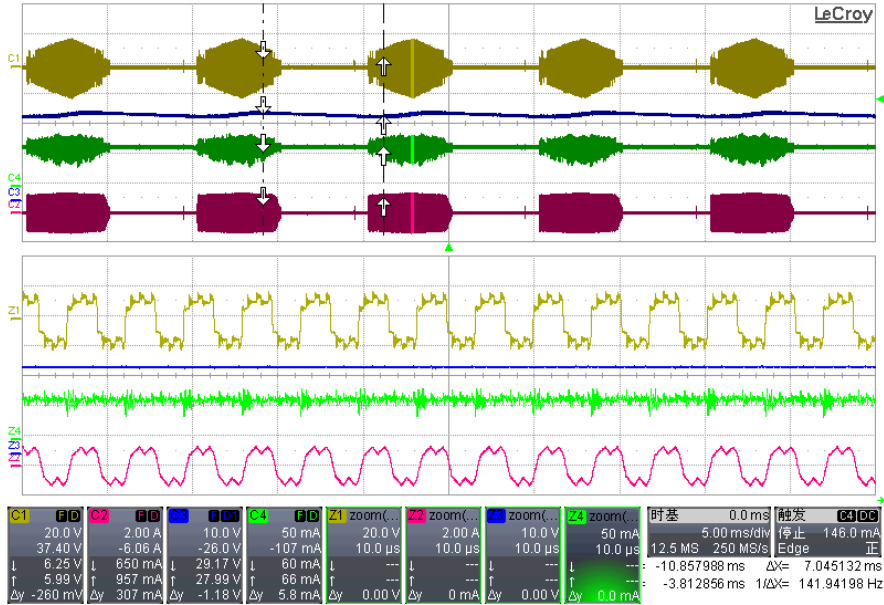
(Channel 1:V2; Channel 2: I2; Channel 3:V3; Channel4: I4)



**Waveform #5** – Middle Dimming with dimmer GUNG =>I4=120mA  
(Channel 1:V2; Channel 2: I2; Channel 3:V3; Channel4: I4)

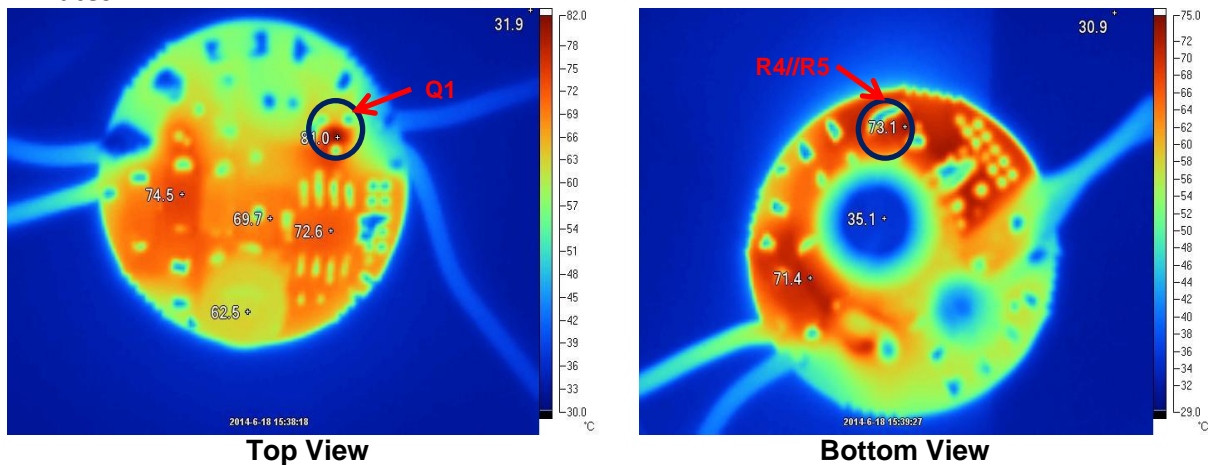


**Waveform #6** – Minimum Dimming with dimmer GUNG =>I4=65mA  
(Channel 1:V2; Channel 2: I2; Channel 3:V3; Channel4: I4)



### Thermal Test

The test is with electronic transformer (OSRAM HTM 70/230-240), and the board burns for 30 minutes.





### Transformer Compatibility List

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

Index	Electronic Transformers (230VAC to 12VAC)		Performance (No Flicker)
	Brand	Model	
1	OSRAM	ET-Z 60 (20-60W)	√
2	OSRAM	HTM 70/230-240 (20-70W)	√
3	PHILIPS	ET-E 105(50-105W)	√
4	PHILIPS	PRIMALINE 70(20-70W)	√
5	SELF	SET105F-2(35-105W)	√
6	IBL	4104.00 (20-60W)	√

#### 2) 230VAC to 12VAC Electronic Transformers

Index	230VAC Dimmer Type	Electronic Transformers (230VAC to 12VAC)	
		OSRAM HTM 70/230-240	IBL 4104.00
1	Busch 2247U	√	√
2	Busch 6513 U-102	√	√
3	Sciemiacz	√	√
4	N Alogenlampen	√	√
5	D1 53803	√	√
6	GUNG 225 NV DE	√	√
7	SIEMENS 5TC8 284	√	√

Note: √ = No Flicker

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