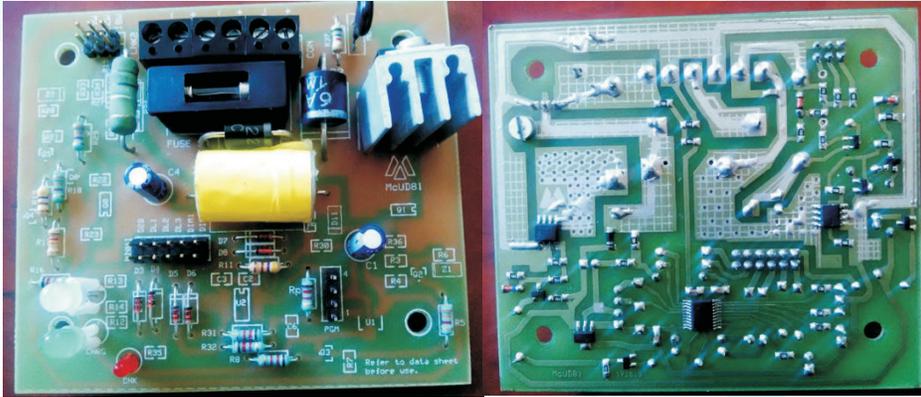


PROPRIETARY DESIGN



AN ISO 9001-2008 CERTIFIED COMPANY

McUD81 MICROCONTROLLER BASED Solar Dusk To Dawn PWM Charge Controller with Built-in Multi load LED Driver and Programmable Auto Dimming / Shut-down

McUD81 is an automatic dusk to dawn controller designed with the latest state-of-art microcontroller based technology for providing highly accurate, easy and economical solution to the OEMs making Solar LED street lights. It is unique to be able to drive any load right from 6W to 18W with simple links provided. If you have different types of solar street lights requirement like 6W, 9W, 12W or 18W, the same controller can be used by simple link provided on board. Also, it can be configured by OEM to make it operate in any of the options below-

1. Plain dusk to dawn operation with constant illumination throughout the night.
2. Selectable automatic switch over to dimming mode after programmable (factory set) delay timings of 4 hours, 5 hours or 6 hours
3. Selectable automatic shut down after programmable (factory set) delay timings of 4 hours, 5 hours or 6 hours
4. Automatic dimming to 50% of full illumination after the selected delay time.
5. **Unique program profile on DIM2 pin: First 5 hours full light, next 5 hours 30% light, remaining hours till dawn it is full light. Practically, very useful and saves the power to reduce panel and battery capacity for a given autonomy.**

Any other delay or dimming can be set as per user needs subject to MOQ.

Additional Features:

*The controller comes with unique No-Battery protection. If only panel is connected without battery (or fuse is blown), the entire circuitry is disabled. This is useful at the time of installation where panels and housings are installed first and batteries are fitted later.

*During instances of lightening in monsoon, it does not switch off instantly.. It has time delay of 10 sec for switching off the lights. So you get uninterrupted light even during lightening at night.

*The controller is given conformal coating for protections against ambient hazards like high humidity or polluted air.

Since the single kit can be used for normal dusk to dawn operation or with delayed off or with delayed dimming to drive not only one type of load but 4 different ones, you save on the inventory. It is truly universal kit of its kind available.

Salient Specifications:

SYSTEM: 12V Nominal
 CAPACITY: Panel 80 Wp Max, Load 2.1Amax smps for led load
 REGULATION: LOW LOSS, SHUNT TYPE
 OVD: Output Voltage Drop < 200 mV at 2.1A load
 IVD: Input Voltage Drop < 330mV at 5 A charge
 LVD: Low Voltage Disconnect, 10.8V
 HVD: High Voltage Disconnect, 14.2 V
 LVR: Low Voltage Reconnect, 12.3 V
 HVR: High Voltage Reconnect, 14.15V
 (Battery Charging is PWM type by default)
HVP: Battery high voltage protection. If battery voltage > 15V, Load is disconnected, charging control disabled

PROTECTIONS: Short circuit and overload at load
 Reverse polarity of Battery and Panel
 Reverse current flow from battery to panel
 Lightening protection in panel circuit

ON BOARD FUSE: 5A , glass type. To protect from over size panel and reverse connections of battery

APPLICATION: IN - FIXTURE USE ONLY.
 AMBIENCE: Operating Temp 0 to 50 Deg C, 80% RH
 DIMENSIONS: 92 L x 80 W x 30 H (all dim in mm)

Indicators and Controls:

CHARGING: **Green LED**. Turns on when panel voltage is more than 13V to indicate positive charging. It starts flickering when battery is charged and goes in PWM mode of absorption.

BAT STATUS : **BICOLOUR LED**.

1. Turns Red when battery reaches LVD and disconnects the load. **(BAT LOW)**
 2. RED turns on and off if battery voltage is between 11V and 12.3V. **(BAT RESERVE)**
 3. Turns Green when battery is **HEALTHY** (between 12.3V and 14.2V)
- Alternates **Red** and **Green** when battery > 15V . Load is disconnected. Charging is disabled. Dusk to Dawn operation: Load turns on at dusk and shuts down at dawn automatically.

6-WAY TERMINAL "CON": On board connector marked PV+, PV-, BT+, BT-, LD+ and LD- to make connections to respective inputs and outputs.

Note: LD+ and LD- are load terminals which here are to be connected to power LED cluster in fixture directly. The output is SMPS suitable to drive with constant current upto 2.1 Amax drive irrespective of battery voltage between HVD and LVD thereby maintaining the constant illumination from fixture. The LED drive current is set to desired value as per requirement with links provided on kit.

USER ACCESSIBLE SETTINGS:

"LNK1": Short D2D for full light throughout the night. Short DL1 (6 hours delay), DL2 (5 hours delay), DL3 (4 hours delay). Short DIM1 (50% light) till dawn after selected delay.

Short DIM2 for first 5 hours full light followed by 5 hours of 30% light followed by full light again for about a couple of hours till dawn.

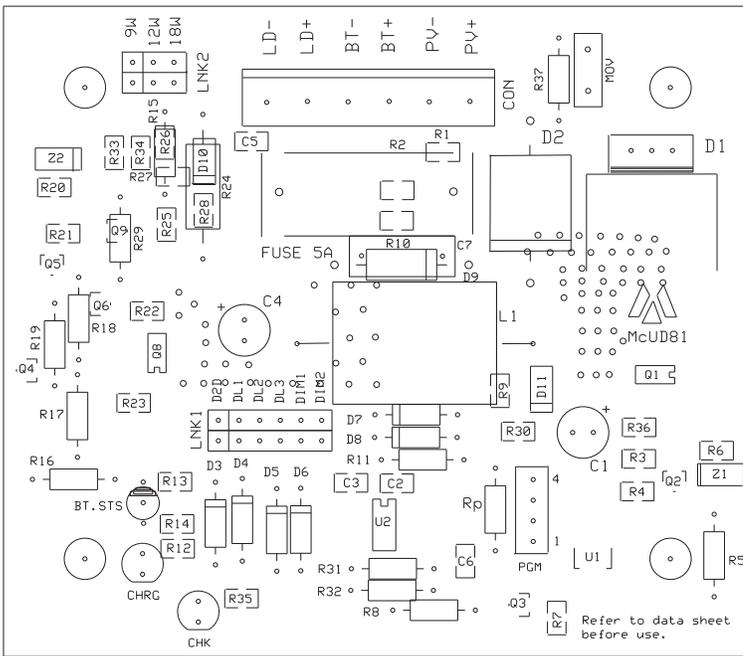
3-WAY 2-PIN "LNK2": 6W operation when no link used. For 9/12/18W operation, use respective link. Short links are provided with every controller.

Please refer to operating instructions for setting desired operation.

OPERATING INSTRUCTIONS: McUD81



IMPORTANT: READ THESE INSTRUCTIONS BEFORE USE.



dim 92 x 80

1. A **6-way connector 'CON'** is meant to make connections to Load (LD+ and LD-), Battery (BT+ and BT-) and Panel (PV+ and PV-). Load should be normally parallel combination of 3-LED series links as per desired wattage. Battery should be of 12V nominal voltage. Panel should be 12V nominal upto 80Wp. Ensure that panel current under STC should be not more than C/10 of battery.

2. On board glass fuse should not be changed to any other value than factory default.

3. This kit can be used for 6W/9W/12W/18W load (i.e. 2 /3/4 or 6 links of 3-LED series).

4. **'LNK2'** is meant to select the load as marked on it. By default, when no short link is used, it works as 6W driver. When link is placed on 9W, load current is set to the said wattage. Similarly for other wattages mentioned. Ensure proper link as per the load. Only one of the 3 links should be used.

5. **'LNK1'** is another set of links for selection of different mode of operation.

'D2D' link is used for normal dusk to dawn operation of the load with the constant illumination of full load. No other links are to be used for this operation.

'DL1' is used to switch of load after 6 hours.

'DL2' is used to switch of load after 5 hours.

'DL3' is used to switch of load after 4 hours.

When DL1, DL2 or DL3 is used, D2D must be open.

DL1, DL2, DL3 can be used in conjunction with link marked 'DIM1'.

Light will be 50% after the set delay period till dawn.

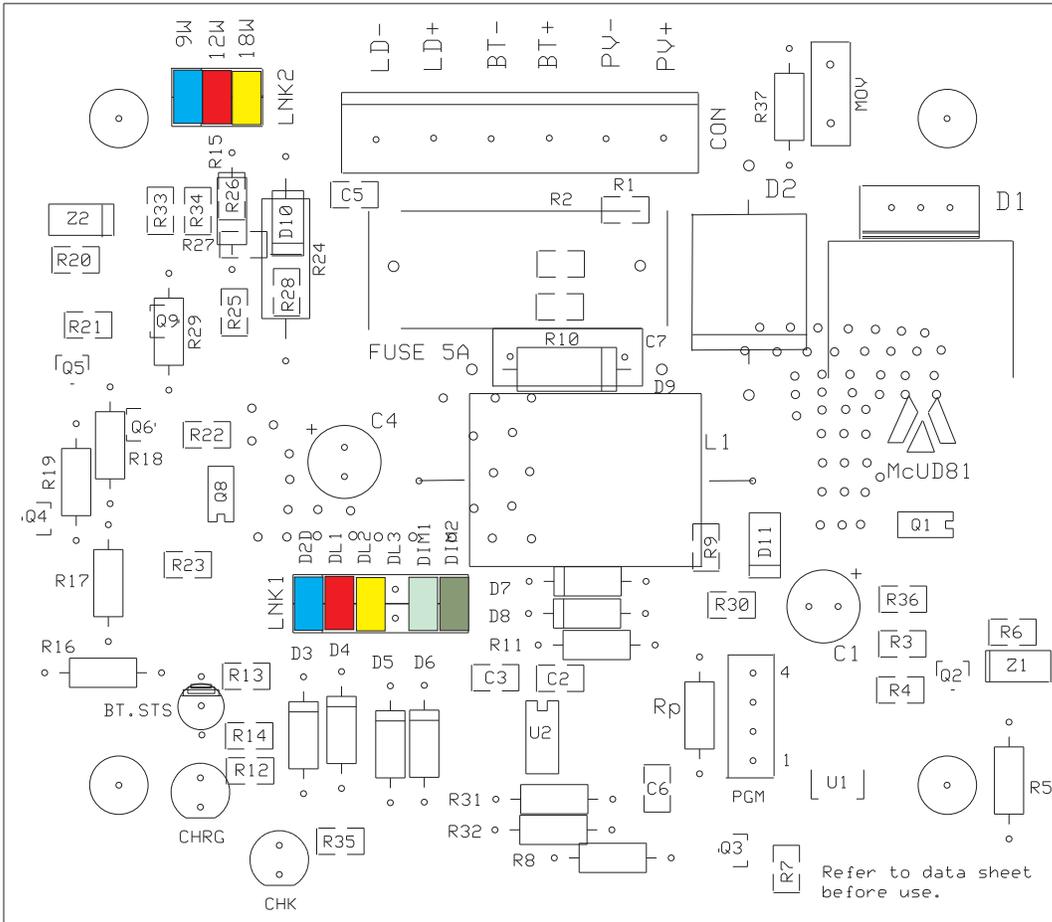
Thus, for example, if you use 'DL2' link and 'DIM1' link, the load will be 50% after 5 hours. It will be dim till dawn. Notice that two links are needed for dimming operation, while for switching off the load after desired delay, dimming links are not to be used at all. Also, note D2D link is not used when delay operation is used.

USE DIM2 link (no other links to be used) only and it will run in a profile of 5 hours full light followed by 5 hours of 30% light and then again to full light till dawn for about two hours. This mode is recommended and factory setting is done on this mode as a default mode.

GENERAL PRECAUTIONS:

Utmost care is taken while designing the kit with view to having full protections against commonly encountered eventualities. You should, however, give proper attention to the following points.

1. Always connect battery first with proper polarity. (If battery is connected in reverse direction, the on-board fuse will blow). The 'BT.STS' LED should turn green which indicates battery is in healthy state (>12.3V). When making connections for the first time, load will not be on unless, BT.STS is Green.
2. Connect the load to the terminals of CON as described above. Load should be on.
3. Connect panel in the last. For reasons beyond control, if panel is first connected without battery, 'CHRG' GREEN LED will turn on and also 'BT.STS' Bicolour LED will turn Red and Green alternately. Under such conditions load is always disconnected and charging control is disabled. (Uncontrolled equalisation mode). When battery is connected, it will come to normal mode immediately.
4. Do not connect panel of more than 80Wp capacity. If higher wattage panel is used, on-board fuse will blow. For 80Wp panel, connected battery must be of at least 60Ah capacity. The higher the capacity, the better. Charging current to the battery should never be more than C/10 capacity of battery.



EXAMPLES OF SELECTION OF LNK 1 / LNK 2 PINS :

FOR 6W Load and full light throughout the night: No link at LNK2, and LNK 1	
For 12W load and dimming after 5hours to 50%: LNK2	
	 
	LNK1
For 18W load and load switched off after 6 hours: LNK2	
	
	LNK1
For 9W load . Full light first 5 hours, 30% light next 5 hours and again full light till dawn	
	
	LNK1



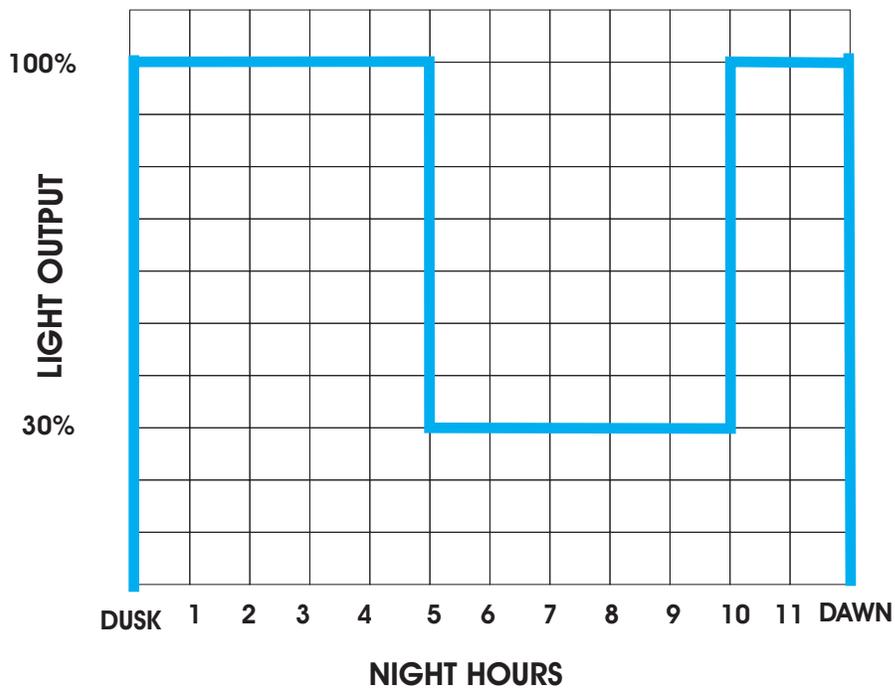
UNIQUE PROFILE ON PIN DIM2:

Pin DIM2 is configured in a unique profile,

<i>From Dusk to 5 hours</i>	<i>100% light</i>
<i>Next 5 hours</i>	<i>30% light</i>
<i>Approx 2 hours before dawn</i>	<i>100% light</i>

This is very useful feature for street lights as the people get full light in the wee hours of the day when they start out for work. Please note, you still have automatic shut down of load after provided time delays or 50% light till dawn. Only Pin DIM2 has been assigned a different job.

DIM2 MODE OF OPERATION :



NOTE: FOR SIMPLICITY, NIGHT AND DAY TIMES ARE ASSUMED TO BE EQUAL TO 12 HOURS. THESE WILL CHANGE AS PER SEASON.

EASY WAY TO SELECT THE PINS AT LNK 1

SR NO	D2D	DL1	DL2	DL3	DIM1	DIM2	RESULT
1							100 % LIGHT FROM DUSK TO DAWN
2	NC				NC	NC	FIRST 6 HOURS FULL LIGHT THEN OFF
3	NC					NC	FIRST 6 HOURS FULL LIGHT THEN 50% LIGHT TILL DAWN
4	NC	NC			NC	NC	FIRST 5 HOURS FULL LIGHT THEN OFF
5	NC	NC				NC	FIRST 5 HOURS FULL LIGHT THEN 50% LIGHT TILL DAWN
6	NC	NC	NC		NC	NC	FIRST 4 HOURS FULL LIGHT THEN OFF
7	NC	NC	NC			NC	FIRST 4 HOURS FULL LIGHT THEN 50% LIGHT TILL DAWN
8	NC	NC	NC	NC	NC		FIRST 5 HOURS FULL LIGHT, NEXT 5 HOURS 30% LIGHT, THEN FULL LIGHT TILL DAWN
							LEGENDS
			DON'T CARE				
			PIN CONNECTED				
		NC	NO CONNECTION				