



SRI MANAKULA VINAYAGAR  
ENGINEERING COLLEGE  
(AN AUTONOMOUS INSTITUTION)



DEPARTMENT OF  
ELECTRICAL AND ELECTRONICS ENGINEERING

# RENEWABLE ENERGY CLUB ANNUAL REPORT

(Academic Year: 2025 to 2026)



Submitted by

Dr.D.Sivaraj / Mr.S.Elanthamizh

Associate Professor / Assistant Professor

Club Coordinator

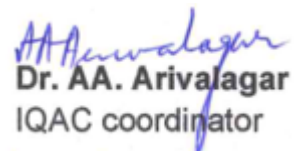


## Preface


The Renewable Energy Club of the Department of Electrical and Electronics Engineering, Sri Manakula Vinayagar Engineering College, serves as a dedicated platform to promote awareness, innovation, and practical learning in the field of renewable and sustainable energy systems. The club is established with the objective of bridging the gap between theoretical knowledge and real-time applications in areas such as solar energy, wind energy, energy storage systems, electric vehicles, smart grids, and sustainable power generation technologies. The club actively encourages students to explore emerging trends in renewable energy through hands-on demonstrations, technical workshops, training programs, expert lectures, project development, and interdisciplinary activities, including practical exposure to solar power generation, solar pumping systems, solar trackers, autonomous solar-based robots, and sensor-based energy applications. By fostering analytical thinking, problem-solving skills, environmental responsibility, and teamwork, the club aims to prepare students to address global energy challenges and contribute to sustainable development. The effective functioning of the club is supported by a committed team of faculty coordinators and student office bearers, including the President, Vice President, Secretary, and Technical Members, who work collaboratively to plan, organize, and execute various technical and co-curricular activities. Through continuous learning, innovation, and industry-oriented initiatives, the Renewable Energy Club strives to develop technically competent, socially responsible, and professionally skilled engineers, thereby contributing to the academic excellence and technological advancement of the institution.



HOD/ EEE  
(P. Jamuna)



Dr. AA. Arivalagar  
IQAC coordinator



Dean Academics  
(Dr.S.Abumalar)



Director cum Principal  
(Dr.V.S.K.Venkatachalapathy)

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## ABOUT THE INSTITUTE

Sri Manakula Vinayaga Educational Trust was founded to provide quality and affordable education to the weaker sections of society. The trust established Sri Manakula Vinayagar Engineering College (SMVEC) in 1999. SMVEC is an autonomous institution affiliated to Pondicherry University. It offers 13 undergraduate, 8 postgraduate and 11 Research programs in engineering. SMVEC has been accredited by NAAC with “A” grade and NBA. The institution is also accredited by TATA consultancy services. The college has a good placement record with students getting job offers from top companies in India and abroad. SMVEC students have won many awards and accolades for their academic achievements. To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

### Vision

- To nurture the cornerstone of excellence in engineering education and drive innovation by seamlessly integrating the fundamentals of Science and Humanities

### Mission

**M1: Quality Education :** To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

**M2: Research and Innovation :** To foster value-based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

**M3: Employability and Entrepreneurship :** To inculcate the employability and entrepreneurial skills through value and skill based training.

**M4: Ethical Values :** To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society



## DEPARTMENT VISION AND MISSION

### Vision

To promote proficiency in the field of Electrical and Electronics Engineering by creating a stimulating environment for research, innovation and entrepreneurship.

### Mission

- **Academic Excellence:** To impart high quality technical education with problem solving capabilities by innovative pedagogy in emerging technologies
- **Industrial and Societal Needs:** To cater the dynamic needs of the industry and society by strengthening industry - institute interaction.
- **Research and Innovation:** To nurture the spirit of research attitude by carrying out innovative technologies pragmatically.
- **Placement and Entrepreneurship:** To inculcate the professionalism in career by advancing synergetic skills to compete in the corporate world.



## ABOUT RENEWABLE ENERGY CLUB

Renewable energy systems are referred to as sustainable power solutions designed to harness naturally replenished energy sources such as solar, wind, biomass, hydro, and geothermal energy. Renewable energy technologies are widely applied in areas such as power generation, electric vehicles, smart grids, energy storage systems, green buildings, and rural electrification. Considering the increasing global energy demand, environmental concerns, and the need for sustainable development, renewable energy can be regarded as one of the most significant technologies of the present and future.

The function of the Renewable Energy Club is to build strong fundamentals in energy systems and sustainability concepts. This club aims to explore emerging topics and practical applications that extend beyond the regular curriculum, including recent advancements, policies, and real-world case studies. The club supports students by integrating knowledge from electrical, mechanical, electronics, and environmental engineering, enabling them to develop innovative, eco-friendly solutions and prepare for challenges in the evolving energy sector.

### Objectives of Renewable Energy Club

- To create awareness about the importance of renewable energy and sustainable development among students.
- To provide fundamental knowledge on various renewable energy sources such as solar, wind, biomass, and hydro energy.
- To expose students to emerging technologies and recent advancements in the renewable energy sector beyond the curriculum.
- To encourage hands-on learning through workshops, projects, and demonstrations related to renewable energy systems.

## OFFICE BEARERS AND STUDENT MEMBERS

S.No.	Name	Position
1	Dr.D.Sivaraj	Staff Coordinator
2	Mr.S.Elanthamizh	
3	Vaheendrane. R	President
4	Subathran. M.R	Vice President
5	Manimurugan. A	Secretary
6	Atchayakumar. S	Treasurer
7	Divya. R	Joint Secretary
8	Sowmya. M	Joint Treasurer
9	Neeraja. J.L	Executive Members
10	Gunanithi. R	Technical Members



**Dr. D. SIVARAJ**  
Associate Professor  
Faculty Coordinator



**VAHEENDRANE. R**  
President



**SUBATHRAN. M. R**  
Vice President



**MANIMURUGAN. A**  
Secretary



**ATCHAYAKUMAR. S**  
Treasurer



**GUNANITHI. R**  
Technical Member

REGISTER NUMBER	STUDENT NAME
23UEE002	ABINAYA V
23UEE003	AJAIY R
23UEE004	AKASH V
23UEE008	ARUNACHALAM R
23UEE010	ASHOKKUMAR G
23UEE013	ATCHAYAKUMAR S
23UEE015	AYISHU A
23UEE017	BALAJI RAM S
23UEE019	BARANIDHARAN K
23UEE023	DEVANADAN K
23UEE025	DHARANIKUMAR B
23UEE026	DIVYA R
23UEE031	GAUSHIK ADHIBAN E
23UEE033	GOKUL V
23UEE035	GOUTHAM G
23UEE038	GUNANIDHI R
23UEE042	ISREYA B
23UEE045	JAIADITHYAN V
23UEE050	KIRUTHIK RAJ D
23UEE055	MAHALAXSHMI M
23UEE056	MALARAVAN M
23UEE057	MANIMURUGAN A
23UEE058	MANOJ KUMAR M
23UEE059	MATHIYARASAN T
23UEE060	MINU S
23UEE061	MOHAMMED FAROOK A
23UEE063	NANDHAKUMAR S
23UEE064	NEERAJA J L
23UEE065	NIRANJAL VEERAN K
23UEE066	NITHISH M
23UEE068	PADMASRI G
23UEE069	POOJA A
23UEE070	PRIYADHARSHINI I
23UEE073	PUGAZHENDIRAN N
23UEE074	PUSHPARAJ V
23UEE077	RAJA SABARI V
23UEE078	RANJITH D
23UEE079	RANZEEITH R
23UEE081	ROUBAN A
23UEE082	RUTHIRA V
23UEE084	SANDHIYA G
23UEE085	SANTOSH B B
23UEE086	SELVA RAHUL S
23UEE088	SHREE KANTH T
23UEE090	SIVASURYA S
23UEE091	SIVAVEL K
23UEE092	SOWMYA M

23UEE094	SUBATHRAN M R
23UEE095	SUBHASRI P
23UEE096	SUGHI R
23UEE104	VAHEENDRANE R
23UEE105	VASANTHAKUMAR S
23UEE108	YAMUNA E
23EEL001	AHARIHARAN V
23EEL003	RAHUL P
23EEL004	SHYLENDRER T
23UEE001	ABDUL SALEEM A
23UEE005	ANANTHA SOUNDARYA E
23UEE006	ANBAZHAGAN B
23UEE007	ANGALAN A
23UEE009	ARUNESH E
23UEE011	ASWIN DHAYAL S
23UEE012	ATCHAYA S
23UEE014	AVINASH K
23UEE016	BALAJI A
23UEE020	BARATH S
23UEE021	CHATHENYA S
23UEE022	DEVAGURU S
23UEE024	DHANUJA S
23UEE027	DIVYADHARSHINI N
23UEE028	ELANCHEZHIAN S
23UEE029	FAHIM AHMAD F
23UEE030	FAYAS FAZIL A
23UEE032	GOKELA S
23UEE036	GOWTHAM D
23UEE037	GOWTHAMA GHUGAN S
23UEE039	HARIHARAAN S
23UEE041	HITESH S
23UEE043	IYYANAR D
23UEE044	IYYAPADASS R
23UEE046	KAMESH V
23UEE047	KANAKADURGA B
23UEE048	KARTHIK I
23UEE049	KAVYAA K
23UEE051	KISHORE KUMAR S
23UEE052	LAVANYA K
23UEE053	MADHANGOPAL I
23UEE054	MADONNA E
23UEE062	MOULEESWAR B
23UEE067	OVIYA S
23UEE071	PRIYADHARSHINI M
23UEE072	PRIYANKA J
23UEE075	RAGUL M
23UEE076	RAGUL M
23UEE080	REEGAN P
23UEE083	SACHIN V
23UEE087	SHIBU B
23UEE089	SIVARAJ P
23UEE093	SRI ROSHAN R
23UEE097	SURENDAR K
23UEE099	SWETHA P
23UEE100	TEENESHWAR B
23UEE101	THAMIZHARASU E

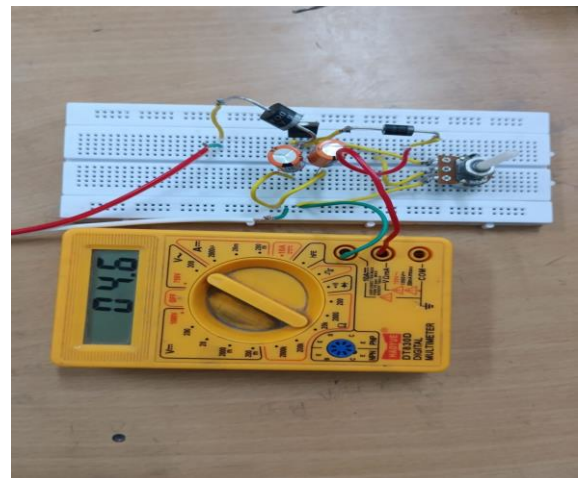
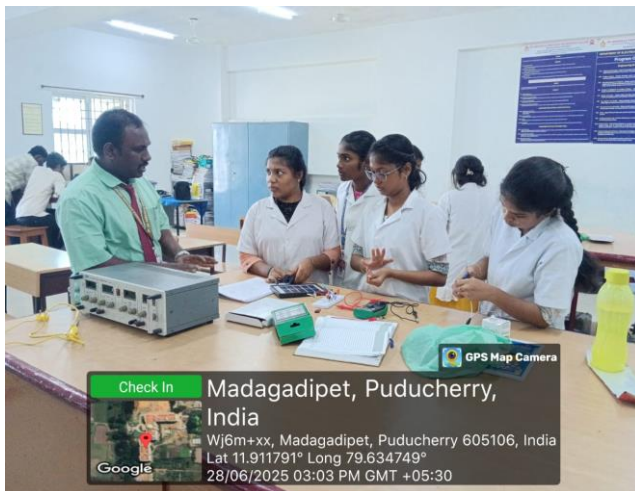
23UEE102	THEJESHWAR RAJA S
23UEE103	THIRUMURUGAN V
23UEE106	VINAYAGAMOORTHY A
23UEE107	VISHNUVARTHAN A
23EEL002	HARISH.D

**ACTIVITIES CARRIED DURING ACADEMIC YEAR 2025 - 2026**

S.No	Date	Activities	Student Benefited
1.	28.06.2025	Design of Solar Voltage Regulator using LM317	105 III / EEE

## DESIGN OF SOLAR VOLTAGE REGULATOR USING LM317

<b>Title</b>	<b>Design of Solar Voltage Regulator using LM317</b>
<b>Date</b>	<b>28.06.2025</b>
<b>Venue</b>	<b>Power Electronics Laboratory</b>
<b>Name of the Staff</b>	<b>Mr. G. Rajavel AP/EEE Mr. R. Vignesh AP/EEE</b>
<b>Audience</b>	<b>II Year and III Year EEE Students</b>
<b>No. of Students</b>	<b>235</b>
<b>Renewable Energy Club Incharges</b>	<b>Dr.D.Sivaraj, AP/EEE</b>



When the temperature rises above the threshold point, then the DC fan will rotate to regulate the temperature.

**INTRODUCTION:**

This activity implements a solar voltage regulator using LM317 to produce a stable 5V DC (USB-level) output from a 12V, 10W solar panel for low-power charging applications and demonstrations in renewable energy systems. The regulator, input/output capacitors, and protection diodes stabilize panel fluctuations and prevent reverse current, ensuring safe charging of USB devices and Li-ion cells under variable irradiance.

**COMPONENTS REQUIRED**

S.No	Components	Specification	Quantity
1	Solar Panel	12V, 10W	1
2	LM317 Regulator	Adjustable Regulator	1
3	Diode	6A	1
4	Diode	1N5408	1
5	Resistor (R1)	10k $\Omega$	1
6	Resistor (R)	220 $\Omega$	1
7	Capacitor (C1)	1000 $\mu$ F, 25V	1
8	Capacitor (C2)	1000 $\mu$ F, 16V	1
9	USB Port	Female type	1
10	Connecting wires	-	As req.

**FORMULA USED:**

The output voltage of the LM317 is given by the formula:

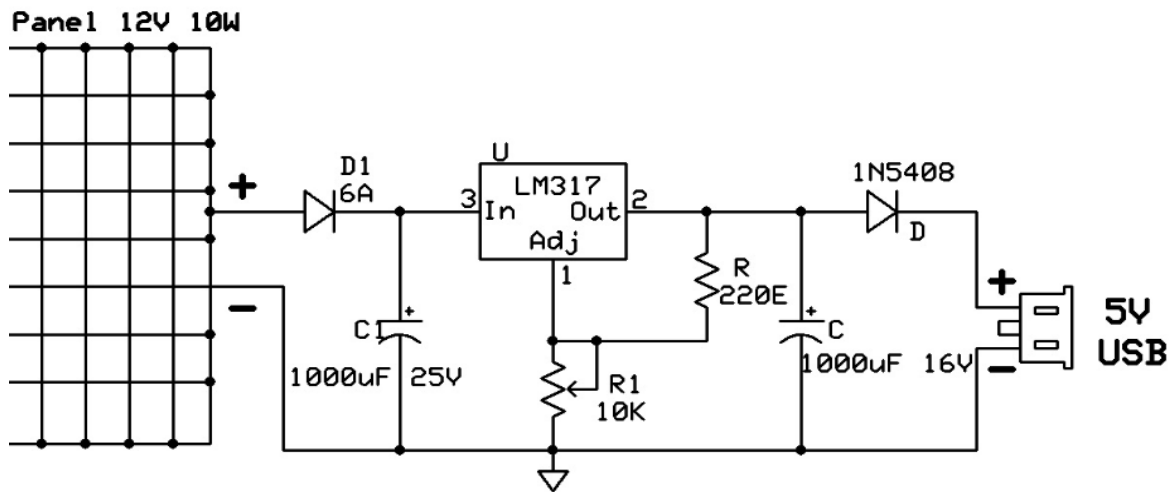
$$V_{out} = V_{ref} \left( 1 + \frac{R_1}{R} \right)$$

Where,  $V_{ref} = 1.25$

**WORKING:**

Incoming panel voltage ( $\approx 10$ – $17$  V depending on sunlight) is fed to LM317 with a resistor network that sets the desired output, while input/output capacitors smooth ripple and diodes block backflow during low-light conditions. The output is tuned to about 5.1 V at the USB port (accounting for diode drop after LM317), keeping device-side voltage within the USB tolerance band under typical load.

**CIRCUIT DIAGRAM:**



### APPLICATIONS:

- Cooling for power supplies, amplifiers, chargers, and small enclosures where temperature-based automatic airflow is required.
- Smart ventilation for PCs, 3D-printer cabinets, battery packs, and automotive electronics compartments.
- Educational demonstration of thermistor sensing, op-amp comparators, and transistor switching for control systems labs.

### DESIGN CALCULATION:

Requirement: Regulate a 12 V, 10 W solar panel to a USB-compatible output via LM317 with an output protection diode, targeting approximately 5.1 V at the USB port under load conditions.

Output diode drop: 1N5408 typically drops about 0.7–1.0 V at forward conduction, so set the LM317 to about 5.8 V before the diode to obtain roughly 5.1 V at the USB port after the diode.

LM317 set-point formula:  $V_{out} = V_{ref} \left( 1 + \frac{R_1}{R} \right) + I_{adj} \cdot R_1$ , where  $V_{ref} \approx 1.25$  and  $I_{adj}$  is small and often neglected for initial sizing

Choose resistors per the report:  $R = 220$  (fixed) and  $R_1 = 10$  (adjustable), then adjust  $R_1$  so the pre-diode set-point is  $V_{set} \approx 5.8$ .

Solve for the needed effective  $R_1$ : neglecting  $I_{adj}$ ,  $R_1 = R \left( \frac{V_{set}}{V_{ref}} - 1 \right) = 220 \left( \frac{5.8}{1.25} - 1 \right) \approx 220 \times 3.64 \approx 801$ , so tune the 10 kΩ adjuster near 820 Ω to achieve about 5.8 V before D2

Post-diode USB voltage:  $V_{USB} \approx V_{set} - V_{D2} \approx 5.8$ , aligning with the report's target and measured outputs.

Input current from panel at rating:  $I = \frac{P}{V} = \frac{10}{12} \approx 0.83$ , noting panel voltage varies with irradiance ( $\approx 10\text{--}17$  V), so regulation margin depends on available headroom.

Dropout headroom check: LM317 requires several volts of headroom between input and output; ensure panel voltage under load exceeds  $V_{\text{set}}$  by a safe margin to maintain regulation, especially at lower irradiance.

Capacitor selection:  $C_1 = 1000 \mu\text{F}$ , 25 V to filter panel ripple with rating above panel open-circuit voltage;  $C_2 = 1000 \mu\text{F}$ , 16 V to smooth regulator output and load steps, per the report.

Protection diodes: D1 (6 A class) before the regulator to block reverse current into the panel in low light; D2 = 1N5408 at output to prevent back-feed from the USB load and provide the required forward drop to reach  $\approx 5.1$  V.

Example thermal check: With  $V_{\text{in}} \approx 12$ ,  $V_{\text{out}} \approx 5.8$  (pre-diode) and  $I_{\text{load}} = 0.5$ , regulator dissipation  $P_D \approx (12 - 5.8) \times 0.5 = 3.1$ , which necessitates a heatsink as noted in the safety/precautions section of the report.

Result alignment: Using  $R = 220$  and dialing  $R_1$  near  $820 \Omega$  yields the designed 5.8 V pre-diode set-point and  $\approx 5.1$  V USB output, matching the tabulated simulated and practical readings in the report.

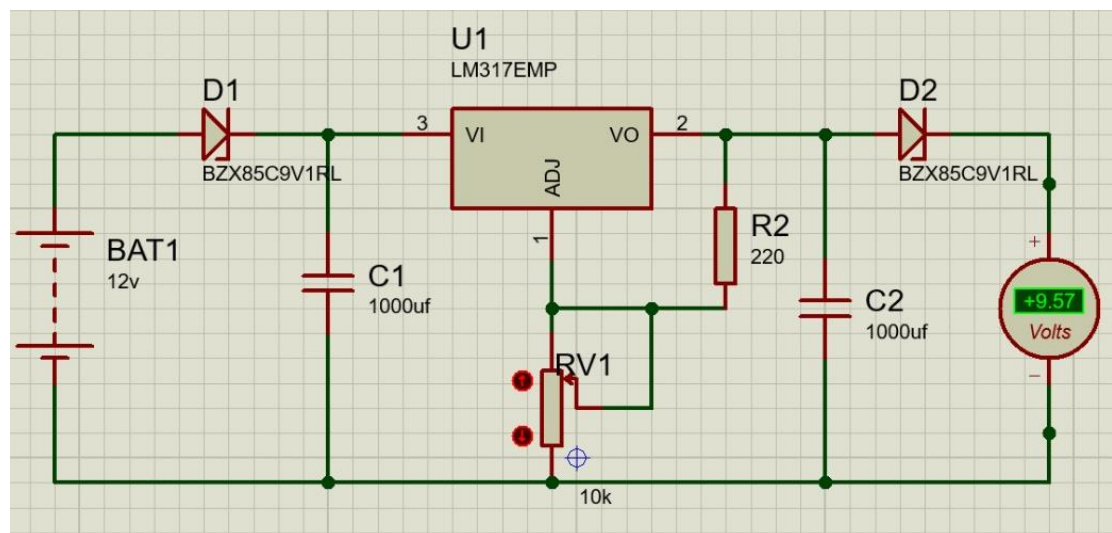
## SUMMARY OF DESIGN

S.No	Components	Specifications	Quantity	Design Reasoning/Formula
1	Solar Panel	12V, 10W	Power source	$10\text{W} \rightarrow \sim 0.83\text{A}$ max current
2	D <sub>1</sub>	6A Diode	Blocks reverse current from capacitor	$I > 1\text{A}$ , $V_R > 20\text{V}$
3	C <sub>1</sub>	1000 $\mu\text{F}$ , 25V	Smooths solar input	Ripple reduction
4	LM317	-	Regulates voltage	Output = 5.8V before D2
5	R	220 $\Omega$	Voltage set resistor	Used in LM317 formula
6	R <sub>1</sub>	10k $\Omega$	Voltage set resistor	Output $\approx 5.8\text{V}$
7	C <sub>2</sub>	1000 $\mu\text{F}$ , 16V	Smooths output voltage	Ripple filter
8	D <sub>2</sub>	1N5408	Drops 0.7V to reach 5.1V, reverse protection	$I > 1\text{A}$ , drop $\approx 0.7\text{V}$
9	USB Port	5V standard	Connect USB devices	Compatible interface

## PRECAUTIONS:

- Ensure correct polarity when connecting the solar panel and battery.
- Do not exceed the input voltage or current ratings of the LM317.
- Always use a heatsink with LM317 when drawing higher current to prevent overheating.
- Avoid charging batteries beyond their rated voltage to prevent damage or hazards.
- Use reverse protection diodes to prevent backflow of current from the battery to the panel.
- Work in a well-ventilated area and avoid short circuits while handling batteries.
- Do not adjust the potentiometer while the battery is connected; set the voltage first.

### SIMULATION DIAGRAM OF SOLAR VOLTAGE REGULATOR USING LM317



### OUTPUT:

S.No	THEORETICAL VALUE (V)	SIMULATION VALUE (V)	PRACTICAL VALUE (V)
1	12	5	5.3
2	10	5	5.2
3	9	5	5.2
4	8	5	5.1

### APPLICATIONS:

#### 1. To Use Solar Energy for Charging Devices

- Solar panels produce 12V DC, but most USB-powered devices (like smartphones) require 5V DC.
- Direct connection of a 12V solar panel to a USB device would damage the device.
- This circuit converts 12V to a stable 5V, enabling safe solar charging for USB devices.

#### 2. To Regulate and Stabilize Voltage

- Solar panels output fluctuate depending on sunlight.

- The LM317 regulator ensures that the output remains steady at  $\sim 5V$ , even if the input varies between 10–16V.

- This is crucial for protecting sensitive electronics (e.g., phones, power banks).

### 3. To Prevent Reverse Current Flow

- Diodes (D1 and 1N5408) prevent backflow of current:

- From capacitor to solar panel during low light.

- From USB device back into the circuit.

- This improves safety and efficiency, especially in battery-less systems.

### 4. To Provide a USB-Compatible Output

- Most modern gadgets charge via USB (5V).

- The circuit offers a standard USB output, making it universally compatible with:

- Mobile phones

- USB lights/fans

- Bluetooth devices

- Portable speakers

- Power banks

### 5. To Enable Off-Grid and Portable Charging

- Useful in rural areas, disaster zones, or during outdoor trips where power is not available.

- Can be used as an emergency backup charger.

Promotes green energy usage and reduces dependency on mains power.

## RESULT:

The solar battery charger circuit successfully regulated the 12V solar input to a stable output voltage using the LM317. The output was adjustable and matched the required charging voltage. The battery charged safely, and the circuit components functioned as expected without overheating or instability.

5 Pin Configuration and Functions

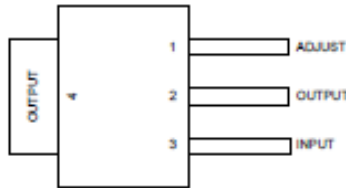


Figure 5-1. DCY Package, 4-Pin SOT-223 (Top View)

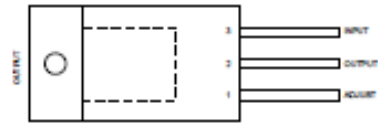


Figure 5-2. KCS or KCT Package, 3-Pin TO-220 (Top View), Legacy Chip

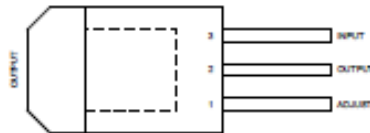


Figure 5-3. KTT Package, 3-Pin TO-263 (Top View)

Pin Functions, Metal Can Packages

NAME	PIN			I/O	DESCRIPTION
	TO-220 (Legacy Chip)	TO-263	SOT-223		
ADJUST	1	1	1	—	Output voltage adjustment pin. Connect to a resistor divider to set $V_{OUT}$ .
INPUT	3	3	3	I	Input voltage pin for the regulator.
OUTPUT	2, TAB	2, TAB	2, TAB	O	Output voltage pin for the regulator.



5 Pin Configuration and Functions

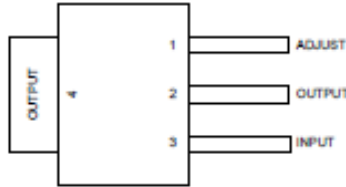


Figure 5-1. DCY Package, 4-Pin SOT-223 (Top View)

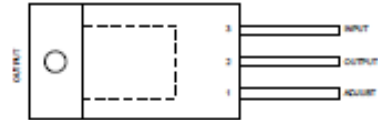


Figure 5-2. KCS or KCT Package, 3-Pin TO-220 (Top View), Legacy Chip

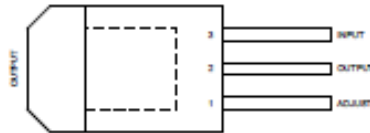


Figure 5-3. KTT Package, 3-Pin TO-263 (Top View)

Pin Functions, Metal Can Packages

NAME	PIN			I/O	DESCRIPTION
	TO-220 (Legacy Chip)	TO-263	SOT-223		
ADJUST	1	1	1	—	Output voltage adjustment pin. Connect to a resistor divider to set $V_{out}$ .
INPUT	3	3	3	I	Input voltage pin for the regulator.
OUTPUT	2, TAB	2, TAB	2, TAB	O	Output voltage pin for the regulator.

# 1N5400 - 1N5408

## Power Diode

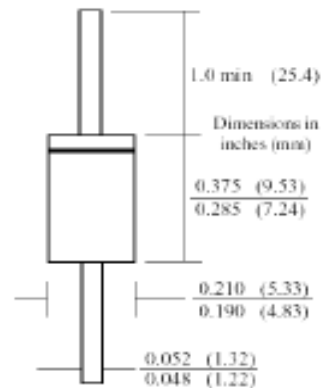


### 1A to 3A, Standard Axial Rectifiers



#### Features:

- 3.0 ampere operation at  $T_A = 75^\circ\text{C}$  with no thermal runaway.
- High current capability.
- Low leakage.



### Ampere General Purpose Rectifiers

Absolute Maximum Ratings\*  $T_A = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Value	Units
$I_O$	Average Rectified Current 0.375" lead length at $T_A = 75^\circ\text{C}$	3.0	A
$I_{T(surge)}$	Peak Forward Surge Current 8.3ms single half-sine-wave Superimposed on rated load (JEDEC method)	200	
$P_D$	Total Device Dissipation Derate above $25^\circ\text{C}$	6.25 50	W mW/°C
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	20	°C/W
$T_{stg}$	Storage Temperature Range	-55 to +150	°C
$T_J$	Operating Junction Temperature		

\*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

### Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

Parameter	Device							Units
	5400	5401	5402	5404	5406	5407	5408	
Peak Repetitive Reverse Voltage	50	100	200	400	600	800	1000	V
Maximum RMS Voltage	35	70	140	280	420	560	700	
DC Reverse Voltage (Rated $V_R$ )	50	100	200	400	600	800	1000	
Maximum Reverse Current at rated $V_R$ $T_A = 25^\circ\text{C}$ $T_A = 100^\circ\text{C}$	5.0 500							$\mu\text{A}$
Maximum Forward Voltage at 3.0A	1.2							V
Maximum Full Load Reverse Current, Full Cycle $T_A = 105^\circ\text{C}$	0.5							mA
Typical Junction Capacitance $V_R = 4.0\text{V}$ , $f = 1.0\text{MHz}$	30							pF



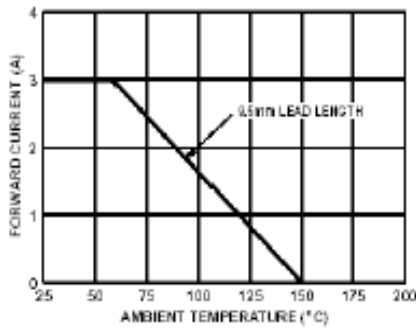
# 1N5400 - 1N5408

## Power Diode

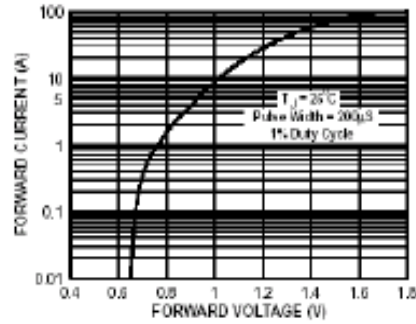


### Typical Characteristics

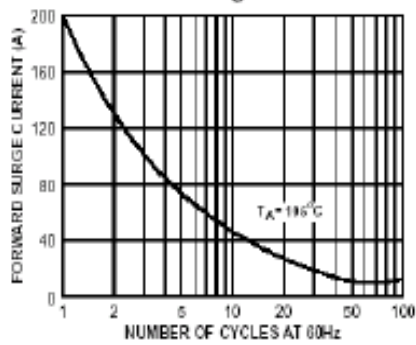
Forward Current Derating Curve



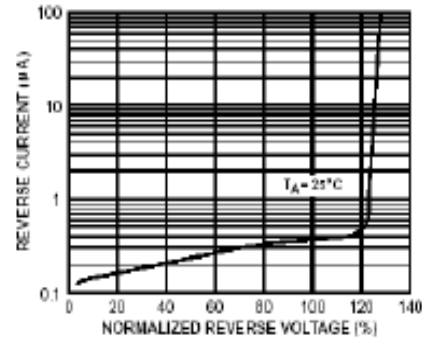
Forward Characteristics



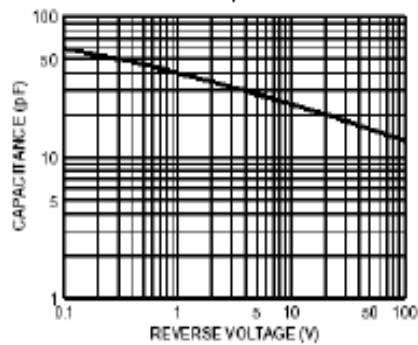
Overload Surge Current



Reverse Characteristics



Junction Capacitance

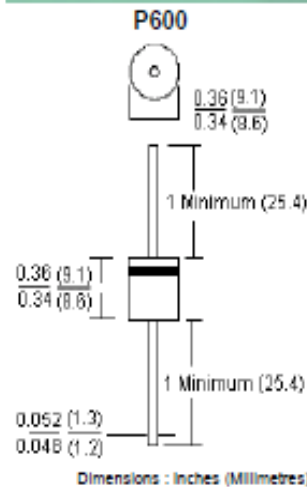


# 6A Power Diodes

## P600 Series



### Standard Axial Rectifiers



### Mechanical Data

Case	: Moulded plastic, P600
Terminals	: Axial leads, solderable per MIL-STD-202, Method 208
Polarity	: Colour band denotes cathode
Mounting Position	: Any
Weight	: 2.1 g

### Features:

- High surge current capability
- Void-free plastic in a P600 package
- High current operation 6 Amperes at  $T_A = 55^\circ\text{C}$
- Exceeds environmental standards of MIL-S-19500/228

### Maximum Ratings and Electrical Characteristics

At  $T_A = 25^\circ\text{C}$  unless otherwise specified. Single phase, half-wave, 60 Hz, resistive or inductive load  
All values except maximum RMS voltage are registered JEDEC parameters

	P600A	P600D	P600G	P600K	P600M	Units
Maximum Recurrent Peak Reverse Voltage	50	200	400	800	1,000	V
Maximum RMS Voltage	35	140	280	560	700	
Maximum dc Blocking Voltage	50	200	400	800	1,000	
Maximum Average Forward Rectified Current $T_A = 55^\circ\text{C}$	6					A
Maximum Overload Surge Current at 1 Cycle (Note 1)	400					
Maximum Forward Voltage at 6 A dc	1					V
Maximum dc Reverse Current at $T_A = 25^\circ\text{C}$	10					$\mu\text{A}$
Rated dc Blocking Voltage at $T_A = 100^\circ\text{C}$	1					mA dc
Typical Junction Capacitance (Note 3) $C_J$	150					pF
Typical Thermal Resistance (Note 2) $R_{\theta JA}$	20					$^\circ\text{C} / \text{W}$
Typical Thermal Resistance (Note 2) $R_{\theta JL}$	4					
Operating Temperature Range	-55 to 150					$^\circ\text{C}$
Storage Temperature Range						

### Notes

1. Peak forward surge current, per 8.3 ms single half-sine-wave superimposed on rated load (JEDEC method)
2. Thermal resistance from junction to ambient and from junction to lead at 0.375 inches (9.5 mm) lead length PCB mounted with 1.1 x 1.1 inches (30 x 30 mm) copper pads
3. Measured at 1 MHz and applied reverse voltage of 4 volts

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# 6A Power Diodes

## P600 Series



### Rating and Characteristic Curves

Fig. 1-Typical Reverse Characteristics

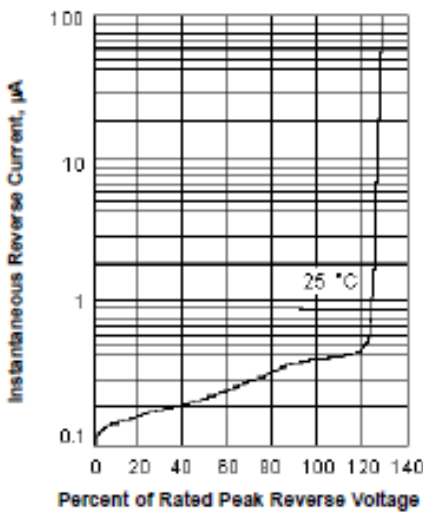


Fig. 2-Forward Derating Curve

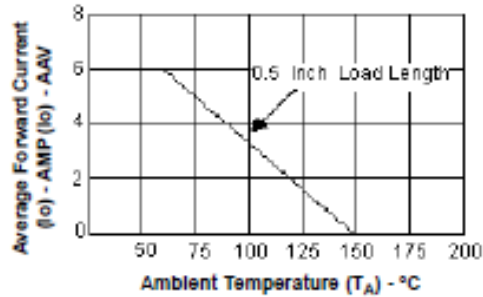


Fig. 4-Typical Instantaneous Forward Characteristics

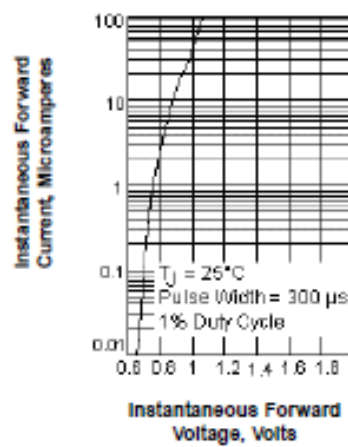


Fig. 3-Typical Transient Thermal Impedance

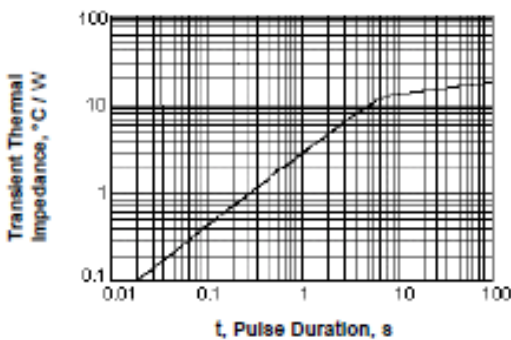
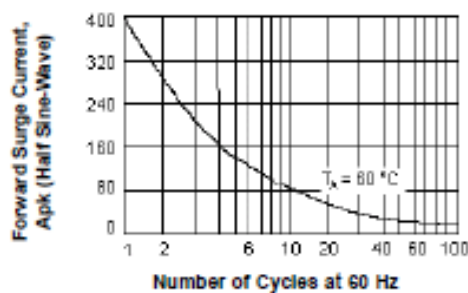


Fig. 5-Maximum Overload Surge Current





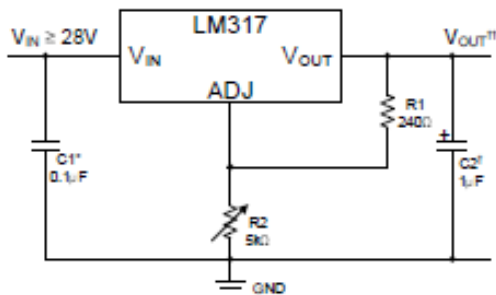
## LM317 3-Pin Adjustable Regulator

### 1 Features

- Output voltage range:
  - Adjustable: 1.25V to 37V
- Output current: 1.5A
- Line regulation: 0.01%/V (typ)
- Load regulation: 0.1% (typ)
- Internal short-circuit current limiting
- Thermal overload protection
- Output safe-area compensation (new chip)
- PSRR: 80dB at 120Hz for  $C_{ADJ} = 10\mu\text{F}$  (new chip)
- Packages:
  - 4-pin, SOT-223 (DCY)
  - 3-pin, TO-263 (KTT)
  - 3-pin, TO-220 (KCS, KCT), legacy chip

### 2 Applications

- Multifunction printers
- AC drive power stage modules
- Electricity meters
- Servo drive control modules
- Merchant network and server PSU



\*Needed if the device is more than 6 inches from filter capacitors.

†Optional, Improves transient response.

\*\*See Equation 1.

$$V_{OUT} = 1.25V \times \left(1 + \frac{R_2}{R_1}\right) + I_{ADJ} \times (R_2) \quad (1)$$

### Typical Application

### 3 Description

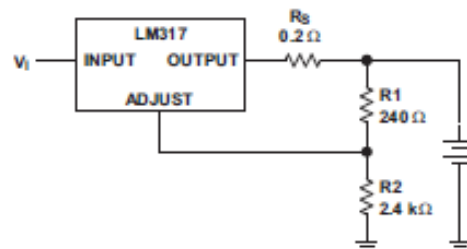
The LM317 is an adjustable three-pin, positive-voltage regulator capable of supplying more than 1.5A over an output voltage range of 1.25V to 37V. The device requires only two external resistors to set the output voltage. The device features a typical line regulation of 0.01% and typical load regulation of 0.1%. The LM317 includes current limiting, thermal overload protection, and safe operating area protection. Overload protection remains functional even if the ADJUST pin is disconnected.

Typically, no capacitors are needed unless the device is situated more than 6 inches from the input filter capacitors. In that case, an input bypass is needed. Add an optional output capacitor to improve transient response. Bypass the adjustment pin to achieve very high ripple rejection ratios that are difficult to achieve with standard 3-pin regulators.

#### Package Information

PART NUMBER	PACKAGE <sup>(1)</sup>	PACKAGE SIZE <sup>(2)</sup>
LM317	DCY (SOT-223, 4)	6.5mm × 7mm
	KTT (TO-263, 3)	10.16mm × 15.24mm
	KCS, KCT (TO-220, 3) (3)	10.16mm × 4.55mm

- (1) For more information, see the [Mechanical, Packaging, and Orderable Information](#).
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.
- (3) Legacy chip.



Battery-Charger Circuit

## LM317


SLV8044Z – SEPTEMBER 1997 – REVISED APRIL 2025



## 4 Device Comparison Table

$I_{OUT}$	PARAMETER	LM317 (Legacy Chip)	LM317 (New Chip)	LM317-N	LM317A	LM317HV	UNIT
1.5A	Input voltage range	4.25 to 40	4.25 to 40	4.25 to 40	4.25 to 40	4.25 - 60	V
	Load regulation accuracy	1.5	1.5	1.5	1	1.5	%
	PSRR (120Hz)	64	80	80	80	65	dB
	Recommended operating temperature	0 to 125	0 to 125	0 to 125	-40 to 125	0 to 125	°C
	TO-220 (NDE) $T_{JA}$	23.5		23.2	23.3	23	°C/W
	TO-200 (KCT) $T_{JA}$	37.9		N/A	N/A		°C/W
	TO-252 $T_{JA}$	N/A		54	54		°C/W
	TO-263 $T_{JA}$	38	41	41	N/A		°C/W
	SOT-223 $T_{JA}$	66.8	59.6	59.6	59.6		°C/W
	TO-92 $T_{JA}$	N/A		186	186		°C/W
		<a href="#">LM317M</a>					
0.5A	Input voltage range	3.75 to 40					V
	Load regulation accuracy	1.5					%
	PSRR (120Hz)	80					dB
	Recommended operating temperature	-40 to 125					°C
	SOT-223 $T_{JA}$	60.2					°C/W
	TO-252 $T_{JA}$	56.9					°C/W
		<a href="#">LM317L</a>		<a href="#">LM317L-N</a>			
0.1A	Input voltage range	3.75 to 40		4.25 to 40			V
	Load regulation accuracy	1		1.5			%
	PSRR (120Hz)	62		80			dB
	Recommended operating temperature	-40 to 125		-40 to 125			°C
	SOT-23 $T_{JA}$	167.6		N/A			°C/W
	SO-8 $T_{JA}$	N/A		165			°C/W
	DSBGA $T_{JA}$	N/A		290			°C/W
TO-92 $T_{JA}$	N/A		180			°C/W	

  
Club Coordinator  
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