

AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been
 filed in the U.S. District Court _____ for the District of Delaware _____ on the following

☐ Trademarks or ☒ Patents. (☐ the patent action involves 35 U.S.C. § 292.);

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT for the District of Delaware
PLAINTIFF Tigo Energy Inc.		DEFENDANT SMA Solar Technology America LLC
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 8,823,218	Sept. 2, 2014	Tigo Energy Inc.
2 8,933,321	Jan. 13, 2015	Tigo Energy Inc.
3 9,584,021	Feb. 28, 2017	Tigo Energy Inc.
4 9,966,848	May 8, 2018	Tigo Energy Inc.
5 10,256,770	Apr. 9, 2019	Tigo Energy Inc.
6 10,333,405	Jun. 25, 2019	Tigo Energy Inc.

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
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Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
 Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy



APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/969,607	06/25/2019	10333405	108144-201504/US (TGY015)	3731

64494 7590 06/05/2019

GREENBERG TRAURIG, LLP (SV)
c/o: Greenberg Traurig LLP - Chicago Office
77 West Wacker Drive, Suite 3100
Intellectual Property Department
Chicago, IL 60601

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Tigo Energy, Inc., Los Gatos, CA;
Mordechai AVRUTSKY, Alfei Menashe, ISRAEL;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Mordechay Avrutsky	Examiner:	Jeffrey Gblende
Serial No.:	15/969,607	Group Art Unit:	2838
Filed:	May 2, 2018	Confirmation:	3731
Title:	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir/Madam:

Applicant respectfully provides the following comments on the Statement of Reasons for Allowance that was provided in the Notice of Allowability mailed in the subject application.

Applicant assumes that the claims are to be interpreted based on the features recited in the claims rather than any paraphrases provided in the Statement of Reasons for Allowance, and the Statement of Reasons for Allowance is to be taken in light of the exact features recited in the claims. The claims should not be interpreted to include the features that are not explicitly recited in the claims. Any paraphrases in the Statement of Reasons for Allowance should not be used in a way to narrow the scope of the claims.

Respectfully submitted,

Date: May 15, 2019

/John P. Ward/
John P. Ward
Reg. No. 40,216

GREENBERG TRAURIG, LLP
CUSTOMER NUMBER **64494**
Phone: (650) 328-8500
Fax: (650) 328-8508

Electronic Patent Application Fee Transmittal

Application Number:	15969607			
Filing Date:	02-May-2018			
Title of Invention:	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module			
First Named Inventor/Applicant Name:	Mordechay AVRUTSKY			
Filer:	John Patrick Ward/Tiffany Weeks			
Attorney Docket Number:	108144-201504/US (TGY015)			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				500

Electronic Acknowledgement Receipt

EFS ID:	36021332
Application Number:	15969607
International Application Number:	
Confirmation Number:	3731
Title of Invention:	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module
First Named Inventor/Applicant Name:	Mordechay AVRUTSKY
Customer Number:	64494
Filer:	John Patrick Ward/Tiffany Weeks
Filer Authorized By:	John Patrick Ward
Attorney Docket Number:	108144-201504/US (TGY015)
Receipt Date:	15-MAY-2019
Filing Date:	02-MAY-2018
Time Stamp:	14:48:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 500
RAM confirmation Number	051619INTEFSW00001015502638
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	108144-201504_IssueFeeTransmittal.pdf	124254	no	2
			194feebdc47d185cad175d8da08c54612a7d6dc0		
Warnings:					
Information:					
2	Miscellaneous Incoming Letter	108144-201504_CommentsOnStatementsReasons.pdf	88276	no	1
			eaf19d1252ef9a7be2c5be43cf6747cc760a9671		
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30462	no	2
			bf8972391f5bc95434cd9e6ffa57e6e2ba91149f		
Warnings:					
Information:					
Total Files Size (in bytes):			242992		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

PART B—FEE(S) TRANSMITTAL

Complete and send this form, together with the applicable fee(s), to: Mail

Mail Stop ISSUE FEE
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, Virginia 22314-1450
 (571)-273-2885

or Fax

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note Use Block 1 for any change of address)

64494
 GREENBERG TRAURIG, LLP (SV)
 c/o: Greenberg Traurig LLP - Chicago Office
 77 West Wacker Drive, Suite 3100
 Intellectual Property Department
 Chicago IL 60601

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, EFS-Web transmitted, or facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Tiffany Weeks	(Depositor's Name)
/Tiffany Weeks/	(S-signature)
May 15, 2019	(Date)

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
15/969,607	05-02-2018	Mordechay AVRUTSKY	108144-201504/US (TGY015)	3731

TITLE OF INVENTION:

APPLN: TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0	\$0	\$500	05-20-2019

EXAMINER	ART UNIT	CLASS-SUBCLASS
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1. Change of correspondence address or indication of "Fee Address" (37CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
- (1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
- (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered attorney or agent. If no name is listed, no name will be printed

1. Greenberg Traurig, LLP
- 2.
- 3.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

1a. NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

TIGO ENERGY, INC.

LOS GATOS, CALIFORNIA

Please check the appropriate assignee categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies

4b. Payment of Fees(s): (Please first reapply and previously paid fee shown above)

- ☐ A check is enclosed
- ☐ Payment by credit card. Form PTO-2038 is attached
- ☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 502638 (enclose an extra copy of this form)

5. Change of Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /John P. Ward/

Date May 14, 2019

Typed or printed name John P. Ward

Registration No. 40216

Page 8 of 140

SMA Solar Technology America, LLC, Ex 1006

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

64494 7590 02/19/2019
GREENBERG TRAURIG, LLP (SV)
c/o: Greenberg Traurig LLP - Chicago Office
77 West Wacker Drive, Suite 3100
Intellectual Property Department
Chicago, IL 60601

EXAMINER

GBLENDE, JEFFREY A

ART UNIT

PAPER NUMBER

2838

DATE MAILED: 02/19/2019

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/969,607	05/02/2018	Mordechay AVRUTSKY	108144-201504/ US (TGY015)	3731

TITLE OF INVENTION: Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	05/20/2019

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

64494 7590 02/19/2019
GREENBERG TRAUIG, LLP (SV)
c/o: Greenberg Traurig LLP - Chicago Office
77 West Wacker Drive, Suite 3100
Intellectual Property Department
Chicago, IL 60601

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/969.607	05/02/2018	Mordechay AVRUTSKY	108144-201504/ US (TGY015)	3731

TITLE OF INVENTION: Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	05/20/2019

EXAMINER	ART UNIT	CLASS-SUBCLASS
GBLENDE, JEFFREY A	2838	323-271000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

1 _____

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☐ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/969,607	05/02/2018	Mordechay AVRUTSKY	108144-201504/ US (TGY015)	3731
64494	7590	02/19/2019	EXAMINER	
GREENBERG TRAURIG, LLP (SV) c/o: Greenberg Traurig LLP - Chicago Office 77 West Wacker Drive, Suite 3100 Intellectual Property Department Chicago, IL 60601			GBLENDE, JEFFREY A	
			ART UNIT	PAPER NUMBER
			2838	
DATE MAILED: 02/19/2019				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b) (2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 15/969,607	Applicant(s) AVRUTSKY, Mordechay	
	Examiner JEFFREY A GBLENDE	Art Unit 2838	AIA Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed on 1/3/2019.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 2,5-9 and 12-18. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☐ All b) ☐ Some *c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)	5. ☒ Examiner's Amendment/Comment
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.	6. ☒ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. ☐ Other _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.	

/JEFFREY A GBLENDE/ Primary Examiner, Art Unit 2838	
--	--

Examiner's Comment

Examiner's Amendment

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Mr. Lehua Wang on 1/29/2019.

The application has been amended as follows:

Regarding claim 12, **delete** "claim 11" and **insert** "claim 13".

Allowable Subject Matter

2. Claims 2, 5-9, and 12-18 are allowed.

3. The following is an examiner's statement of reasons for allowance:

Regarding claim 5, the prior art fails to teach or disclose an apparatus, comprising: a micro-controller; a first stage power converter to generate a first output from a direct current input; a switchable load powered by the first output; a control circuit powered by the first output; and a second stage power converter connected to the first stage power converter and configured to convert the first output to a second output; wherein the control circuit is configured to block the second stage power converter from

powering the micro-controller using the second output in a time period that is after the control circuit is powered by the first output and before a predefined condition is met in the control circuit; and wherein the control circuit is configured to signal the switchable load to be in a first state of consuming the first output during the time period and to be in a second state of not consuming the first output after the time period.

Regarding claim 13, the prior art fails to teach or disclose a method to supply power, the method comprising: generating, by a first stage power converter, a first output from a direct current input; powering a control circuit using the first output; generating, by a second stage power converter connected to the first stage power converter, a second output from the first output from the first stage power converter; blocking, by the control circuit during a time period that is after the control circuit is powered by the first output and before a predefined condition is met in the control circuit, the second output from the second stage power converter from powering a micro-controller; consuming, by a switchable load in a power absorption circuit, a portion of the first output from the first stage power converter during the time period, powering the micro-controller using the second output from the second stage power converter after the time period; and stopping, by the control circuit and after the time period, the switchable load from consuming the first output from the first stage power converter.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFREY A GBLENDE whose telephone number is (571)270-5472. The examiner can normally be reached on M-F 9am-5pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

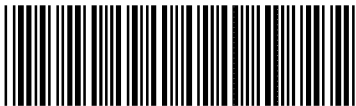
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Monica Lewis can be reached on 571-272-1838. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 15/969,607
Art Unit: 2838

Page 5

/JEFFREY A GBLENDE/
Primary Examiner, Art Unit 2838

Issue Classification 	Application/Control No. 15/969,607	Applicant(s)/Patent Under Reexamination AVRUTSKY, Mordechay
	Examiner JEFFREY A GBLENDE	Art Unit 2838

CPC						
Symbol					Type	Version
H02M	/	3	/	158	F	2013-01-01
H02M	/	3	/	07	I	2013-01-01
H02M	/	1	/	08	I	2013-01-01
H02M	/	1	/	36	A	2013-01-01
H02M	/	2001	/	007	A	2013-01-01
H02M	/	2001	/	008	A	2013-01-01
Y02E	/	10	/	56	A	2013-01-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version
/				

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 13	
/JEFFREY A GBLENDE/ Primary Examiner, Art Unit 2838 (Primary Examiner) _____ (Date) _____		04 February 2019 O.G. Print Claim(s) 1	O.G. Print Figure 3

Issue Classification 	Application/Control No. 15/969,607	Applicant(s)/Patent Under Reexamination AVRUTSKY, Mordechay
	Examiner JEFFREY A GBLENDE	Art Unit 2838

INTERNATIONAL CLASSIFICATION			
CLAIMED			
H02M	/	3	/ 158
NON-CLAIMED			
/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	13	
/JEFFREY A GBLENDE/ Primary Examiner, Art Unit 2838	04 February 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3

Issue Classification 	Application/Control No. 15/969,607	Applicant(s)/Patent Under Reexamination AVRUTSKY, Mordechay
	Examiner JEFFREY A GBLENDE	Art Unit 2838

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
-	1	-	10	-	19										
2	2	-	11	-	20										
-	3	8	12												
-	4	7	13												
1	5	9	14												
3	6	10	15												
4	7	11	16												
5	8	12	17												
6	9	13	18												

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 13	
/JEFFREY A GBLENDE/ Primary Examiner, Art Unit 2838 (Primary Examiner) _____ (Date) _____		04 February 2019 O.G. Print Claim(s) 1	O.G. Print Figure 3

<i>Search Notes</i> 	Application/Control No. 15/969,607	Applicant(s)/Patent Under Reexamination AVRUTSKY, Mordechay
	Examiner JEFFREY A GBLENDE	Art Unit 2838

CPC - Searched*		
Symbol	Date	Examiner
See attached EAST search history	10/15/2018	JG

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventor name search	10/15/2018	JG
See attached EAST search history	10/15/2018	JG
Updated search	01/28/2019	JG

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	Interference search history attached	01/28/2019	JG

/JEFFREY A GBLENDE/ Primary Examiner, Art Unit 2838	
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Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number	15969607
Filing Date	2018-05-02
First Named Inventor	MORDECHAY AVRUTSKY
Art Unit	2838
Examiner Name	GBLENDE, JEFFREY A
Attorney Docket Number	108144-201504/US (TGY015)

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	4719553		1988-01-12	Hinckley	
	2	5235266		1993-08-10	Schaffrin	
	3	5268832		1993-12-07	Kandatsu	
	4	5604430		1997-02-18	Decker, et al.	
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10	6844739	2005-01-18	Kasai, et al.
11	6894911	2005-05-17	Telefus, et al.
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21	7518346	2009-04-14	Prexl, et al.
22	7560915	2009-07-14	Ito, et al.
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24	7605498	2009-10-20	Ledenev, et al.
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27	8004866	2011-08-23	Bucella, et al.
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32	8587151	2013-11-19	Adest, et al.
33	8669675	2014-03-11	Capp, et al.
34	8816535	2014-08-26	Adest, et al.
35	8947194	2015-02-03	Sella, et al.
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37	9143036	2015-09-22	Avrutsky
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42	9966848	2018-05-08	Avrutsky
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	2	20050017701		2005-01-27	Hsu, Chih-Yuan	
	3	20050040800		2005-02-24	Sutardja, Sehat	
	4	20050057214		2005-03-17	Matan, Stefan	
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9	20060176031	2006-08-10	Dustin D. Forman, et al.
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20	20100117614	2010-05-13	Justin P. Bandholz, et al.
21	20110031946	2011-02-10	Patrick K. Egan, et al.
22	20110050190	2011-03-03	AVRUTSKY; Mordechay
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	1	2005262278	AU		2005-07-12	Central Queensland University et al.		
	2	19961705	DE		2001-07-05	SMA Regelsysteme GmbH		
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Examiner Name	GBLENDE, JEFFREY A
Attorney Docket Number	108144-201504/US (TGY015)

4	1388774	EP	2004-02-11	CIT Alcatel
5	2249147	ES	2006-03-16	Fundacion Robotiker
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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	ALONSO, R. et al., "A New Distributed Converter Interface for PV Panels," 20th European Photovoltaic Solar Energy Conference, Barcelona, Spain, pp. 2288-2291, June 6-10, 2005.	
	2	ALONSO, R. et al., "Experimental Results of Intelligent PV Module for Grid-Connected PV Systems," 21st European Photovoltaic Solar Energy Conference, Dresden, Germany, pp. 2297-2300, September 4-8, 2006.	
	3	BASSO, Tim, "IEEE Standard for Interconnecting Distributed Resources With the Electric Power System," IEEE PES Meeting, June 9, 2004.	
	4	Boostbuck.com, "The Four Boostbuck Topologies," located at http://www.boostbuck.com/TheFourTopologies.html , 2003.	
	5	ENSLIN, Johan H.R., et al., "Integrated Photovoltaic Maximum Power Point Tracking Converter," IEEE Transactions on Industrial Electronics, Vol. 44, No. 6, pp. 769-773, December 1997.	
	6	GAUTAM, Nalin K. et al., "An Efficient Algorithm to Simulate the Electrical Performance of Solar Photovoltaic Arrays," Energy, Vol. 27, No. 4, pp. 347-361, 2002.	

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Attorney Docket Number	108144-201504/US (TGY015)

7	International Patent Application No. PCT/US2010/046272, International Search Report and Written Opinion, March 31, 2011.
8	LINARES, Leonor et al., "Improved Energy Capture in Series String Photovoltaics via Smart Distributed Power Electronics," 24th Annual IEEE Applied Power Electronics Conference and Exposition, pp. 904-910, February 15, 2009.
9	NORDMANN, T. et al., "Performance of PV Systems Under Real Conditions," European Workshop on Life Cycle Analysis and Recycling of Solar Modules, The "Waste" Challenge, Brussels, Belgium, March 18-19, 2004.
10	PALMA, L. et al., "A Modular Fuel Cell, Modular DC-DC Converter Concept for High Performance and Enhanced Reliability," 38th IEEE Power Electronics Specialists Conference (PESC'07), pp. 2633-2638, June 17, 2007.
11	QUASCHNING, V. et al., "Cost Effectiveness of Shadow Tolerant Photovoltaic Systems," Euronsun 96, pp. 819-824, September 16, 1996.
12	ROMAN, Eduardo, et al., "Intelligent PV Module for Grid-Connected PV Systems," IEEE Transactions on Industrial Electronics, Vol. 53, No. 4, pp. 1066-1073, August 2006.
13	URIARTE, S. et al., "Energy Integrated Management System for PV Applications," 20th European Photovoltaic Solar Energy Conference, June 6, 2005.
14	WALKER, G. R. et al., "Cascaded DC-DC Converter Connection of Photovoltaic Modules," 33rd IEEE Power Electronics Specialists Conference (PESC'02), Vol. 1, pp. 24-29, 2002.
15	WALKER, Geoffrey R. et al., "Cascaded DC-DC Converter Connection of Photovoltaic Modules," IEEE Transactions on Power Electronics, Vol. 19, No. 4, pp. 1130-1139, July 2004.

If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature	/JEFFREY A GBLENDE/	Date Considered	02/04/2019
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	15969607
Filing Date	2018-05-02
First Named Inventor	MORDECHAY AVRUTSKY
Art Unit	2838
Examiner Name	GBLENDE, JEFFREY A
Attorney Docket Number	108144-201504/US (TGY015)

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number	15969607
Filing Date	2018-05-02
First Named Inventor	MORDECHAY AVRUTSKY
Art Unit	2838
Examiner Name	GBLENDE, JEFFREY A
Attorney Docket Number	108144-201504/US (TGY015)

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

- ☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- ☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Lehua Wang/	Date (YYYY-MM-DD)	2019-01-03
Name/Print	Lehua Wang	Registration Number	48,023

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	14485019	(reference or threshold)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 19:29
L2	565200	second near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 19:30
L3	7113	(de\$1activat\$3 or dis\$1abl\$3 or prevent\$3 or inhibit\$3 or block\$3) near2 L2	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 19:30
L4	337	L3 with L1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 19:30
L5	37160	(switch\$4 with load with series)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 19:31
L6	0	4 same L5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 19:31
L7	15	4 and L5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 19:32
S1	47	((("AVRUTSKY") near3	US-PGPUB;	OR	OFF	2018/10/10

		("Mordechay"))).INV.	USPAT; USOCR			10:18
S2	4	("5565761").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:20
S3	3	("20070001653").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:20
S4	104126	(G05F1/00 G05F1/10 G05F1/12 G05F1/46 G05F1/455 G05F1/45 G05F1/445 H02M5/2573 G05F1/66 H02M1/081 H02M5/293 H02M7/12 H05B39/048 B23K11/24 G05F1/40 G05F1/42 G05F1/44 G05F1/462 G05F1/52 G05F1/56 H02M3/10 H02M3/125 H02M3/13 H02M3/135 H02M3/145 H02M3/15 H02M3/155 H02M3/156 H02M3/158 H02M3/1588 H02M2003/1566 H02M3/1582 H02M2003/1557 H04B2215/069 G05F3/10 G05F3/16 G05F3/18 G05F3/185 G05F3/20 G05F3/26 G05F3/30 G05F3/205 G05F3/22 G05F3/24 G05F3/222 G05F3/242 G05F3/225 G05F3/227 G05F3/245 G05F3/247 G05F3/262 G05F3/265 G05F3/267).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:24
S5	63367	(H02M3/1582 H02M3/1584 H02M3/285 H02M3/33561 H02M7/49 H02J3/46 H02J3/38 H02M1/045 H02M7/006 H02M7/06 H02M7/068 H02M7/153 H02M7/10 H02M1/088 H02M7/103 H02M7/106 H02M7/19 H02M7/08 H02M7/17 H02M2001/007 H02M7/493 H02M7/53806 H02M7/5381).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:24
S6	13193	S4 and S5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:24
S7	553172	second near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:59
S8	6962	(de\$1activat\$3 or dis\$1abl\$3 or prevent\$3 or inhibit\$3 or block\$3)	US-PGPUB; USPAT;	OR	OFF	2018/10/10 10:59

		near2 S7	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S9	14206786	(reference or threshold)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:00
S10	749	S8 same S9	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:01
S11	23	S6 and S10	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:01
S12	74	S10 and S4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:02
S13	51	S12 not S11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:02
S14	54	S10 and S5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:05
S15	31	S14 not S11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:05
S16	33	"5995385"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 14:42

S17	2	("20070278861").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 09:00
S18	65548	(switch\$4 near2 load)	US-PGPUB; USPAT; USOCR	OR	OFF	2018/10/11 18:32
S19	690177	first near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 18:37
S20	553381	second near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 18:37
S21	104148	(G05F1/00 G05F1/10 G05F1/12 G05F1/46 G05F1/455 G05F1/45 G05F1/445 H02M5/2573 G05F1/66 H02M1/081 H02M5/293 H02M7/12 H05B39/048 B23K11/24 G05F1/40 G05F1/42 G05F1/44 G05F1/462 G05F1/52 G05F1/56 H02M3/10 H02M3/125 H02M3/13 H02M3/135 H02M3/145 H02M3/15 H02M3/155 H02M3/156 H02M3/158 H02M3/1588 H02M2003/1566 H02M3/1582 H02M2003/1557 H04B2215/069 G05F3/10 G05F3/16 G05F3/18 G05F3/185 G05F3/20 G05F3/26 G05F3/30 G05F3/205 G05F3/22 G05F3/24 G05F3/222 G05F3/242 G05F3/225 G05F3/227 G05F3/245 G05F3/247 G05F3/262 G05F3/265 G05F3/267).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 18:44
S22	104148	S21	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 18:44
S23	351	S18 same S19 same S20	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 18:44
S24	63	S23 and S21	US-PGPUB; USPAT; USOCR; FPRS;	OR	OFF	2018/10/11 18:44

			EPO; JPO; DERWENT; IBM_TDB			
S25	553381	second near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 19:24
S26	6964	(de\$1activat\$3 or dis\$1abl\$3 or prevent\$3 or inhibit\$3 or block\$3) near2 S25	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 19:24
S27	14213280	(reference or threshold)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 19:24
S28	749	S26 same S27	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 19:24
S29	28	S18 and S28	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 19:24
S30	67	("20030048003" "20050017701" "20050040800" "20050057214" "20050057215" "20060001406" "20060158165" "20060174939" "20060176031" "20060185727" "20070273351" "20080100233" "20080121272" "20080122449" "20080122518" "20080191560" "20080191675" "20080303503" "20100013452" "20100117614" "20110031946" "20110050190" "20110148388" "20150349644" "20170110966" "4719553" "5235266" "5268832" "5604430" "5903138" "5923158" "6275016" "6448489" "6650031" "6844739" "6894911" "6984970" "7061214" "7202653" "7248946" "7256566" "7276886" "7301313" "7397151" "7411316" "7518346" "7560915" "7595616" "7605498" "7719140" "7821281" "8004866" "8013472" "8035249" "8427009" "8531055" "8587151" "8669675" "8816535"	US-PGPUB; USPAT	OR	OFF	2019/01/28 15:58

		"8947194" "9112379" "9143036" "9401599" "9438035" "9584021" "9590526" "9966848").PN.				
S31	66832	(switch\$4 near2 load)	US-PGPUB; USPAT; USOCR	OR	OFF	2019/01/28 18:51
S32	565200	second near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 18:51
S33	7113	(de\$1activat\$3 or dis\$1abl\$3 or prevent\$3 or inhibit\$3 or block\$3) near2 S32	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 18:51
S34	14485019	(reference or threshold)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 18:51
S35	775	S33 same S34	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 18:51
S36	29	S31 and S35	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 18:51
S37	5608	S33 and S34	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 18:57
S38	518650	micro\$1controller or (micro near controller)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 18:58
S39	407	S37 and S38	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2019/01/28 18:59

			IBM_TDB			
S40	704895	first near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 18:59
S41	375	S39 and S40	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 19:00
S42	37160	(switch\$4 with load with series)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 19:21
S43	565200	second near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 19:27
S44	7113	(de\$1activat\$3 or dis\$1abl\$3 or prevent\$3 or inhibit\$3 or block\$3) near2 S43	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/01/28 19:27

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S45	33066	(G05F1/00 G05F1/10 G05F1/12 G05F1/46 G05F1/455 G05F1/45 G05F1/445 H02M5/2573 G05F1/66 H02M1/081 H02M5/293 H02M7/12 H05B39/048 B23K11/24 G05F1/40 G05F1/42 G05F1/44 G05F1/462 G05F1/52 G05F1/56 H02M3/10 H02M3/125 H02M3/13 H02M3/135 H02M3/145 H02M3/15 H02M3/155 H02M3/156 H02M3/158 H02M3/1588 H02M2003/1566 H02M3/1582 H02M2003/1557 H04B2215/069 G05F3/10 G05F3/16 G05F3/18 G05F3/185 G05F3/20 G05F3/26 G05F3/30 G05F3/205 G05F3/22 G05F3/24 G05F3/222 G05F3/242 G05F3/225 G05F3/227 G05F3/245 G05F3/247 G05F3/262 G05F3/265 G05F3/267).CPC.	US-PGPUB; USPAT	OR	OFF	2019/01/28 19:13
S46	17146	(H02M3/1582 H02M3/1584 H02M3/285	US-	OR	OFF	2019/01/28

		H02M3/33561 H02M7/49 H02J3/46 H02J3/38 H02M1/045 H02M7/006 H02M7/06 H02M7/068 H02M7/153 H02M7/10 H02M1/088 H02M7/103 H02M7/106 H02M7/19 H02M7/08 H02M7/17 H02M2001/007 H02M7/493 H02M7/53806 H02M7/5381).CPC.	PGPUB; USPAT			19:13
S47	448364	first near2 (stage or converter or regulator)	US- PGPUB; USPAT	OR	OFF	2019/01/28 19:13
S48	363233	second near2 (stage or converter or regulator)	US- PGPUB; USPAT	OR	OFF	2019/01/28 19:13
S49	10595264	(reference or threshold)	US- PGPUB; USPAT	OR	OFF	2019/01/28 19:13
S50	61756	(switch\$4 near2 load)	US- PGPUB; USPAT	OR	OFF	2019/01/28 19:14
S51	24	(S47 same S48 same S49 same S50).clm.	US- PGPUB; USPAT	OR	OFF	2019/01/28 19:14
S52	17691	(switch\$4 with load with series)	US- PGPUB; USPAT	OR	OFF	2019/01/28 19:20
S53	8	(S47 same S48 same S49 same S52).clm.	US- PGPUB; USPAT	OR	OFF	2019/01/28 19:20

1/ 28/ 2019 7:47:12 PM
C:\ Users\ jgblende\ Documents\ EAST\ Workspaces\ 15969607.wsp

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Mordechay Avrutsky	Examiner:	Jeffrey Gblende
Serial No.:	15/969,607	Group Art Unit:	2838
Filed:	May 2, 2018	Confirmation:	3731
Title:	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		

RESPONSE TO NON-FINAL OFFICE ACTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir/Madam:

In response to the Non-Final Office Action mailed October 18, 2018, please kindly enter the following amendments and consider the following remarks/arguments:

Amendments to the Claims are reflected in the list of claims that begins on page 2 of this paper;

Remarks/Arguments begin on page 6 of this paper.

CLAIMS

1. (Canceled)
2. (Currently Amended) The apparatus of claim ~~[[1]]~~⁵, ~~further comprising:~~
~~a power absorption circuit powered by the first output during the time period;~~
 wherein the predefined condition includes a voltage of the first output reaching a
 threshold; ~~and~~
~~wherein after the time period, the control circuit stops the power absorption circuit from~~
~~consuming the first output from the first stage power converter.~~
- 3-4. (Canceled)
5. (Currently Amended) An apparatus, comprising:
a micro-controller;
a first stage power converter to generate a first output from a direct current input;
a switchable load powered by the first output;
a control circuit powered by the first output; and
a second stage power converter connected to the first stage power converter and
configured to convert the first output to a second output;
wherein the control circuit is configured to block the second stage power converter from
powering the micro-controller using the second output in a time period that is
after the control circuit is powered by the first output and before a predefined
condition is met in the control circuit; and ~~The apparatus of claim 4,~~
 wherein the control circuit is configured to signal~~[[s]]~~ the switchable load to be in a first
 state of consuming the first output during the time period and to be in a second
 state of not consuming the first output after the time period.
6. (Original) The apparatus of claim 5, wherein, when the switchable load is in the second
 state, the voltage above the threshold is sufficient to power the second stage power
 converter to operate the micro-controller for at least a predetermined period of time
 during which the direct current input to the first stage power converter has diminishing
 power.

7. (Original) The apparatus of claim 5, wherein the switchable load comprises:
a resistive device; and
a switching device connected to the resistive device, wherein the switching device is
turned on in the first state to connect the resistive device to the first output and
turned off in the second state to disconnect the resistive device from the first
output.
8. (Original) The apparatus of claim 5, wherein the control circuit delays a first signal
instructing the switching device to change from the first state to the second state to
generate a second delayed signal that instructs the second stage power converter to
change from not powering the micro-controller to powering the micro-controller.
9. (Original) The apparatus of claim 8, wherein the control circuit comprises:
a hysteresis amplifier coupled to the first output to generate the first signal; and
a delay circuit coupled to the first signal to generate the second delayed signal.
- 10-11. (Canceled)
12. (Currently Amended) The method of claim 11, wherein the predefined condition includes
a voltage of the first output reaching a threshold; ~~and the method further comprises:
stopping, by the control circuit after the time period, the power absorption circuit from
consuming the first output from the first stage power converter.~~
13. (Currently Amended) A method to supply power, the method comprising:
generating, by a first stage power converter, a first output from a direct current input;
powering a control circuit using the first output;
generating, by a second stage power converter connected to the first stage power
converter, a second output from the first output from the first stage power
converter;
blocking, by the control circuit during a time period that is after the control circuit is
powered by the first output and before a predefined condition is met in the control
circuit, the second output from the second stage power converter from powering a
micro-controller; ~~The method of claim 11, wherein the consuming includes:~~

consuming, by a switchable load in a power absorption circuit, a portion of the first output from the first stage power converter during the time period;
powering the micro-controller using the second output from the second stage power converter after the time period; and
stopping, by the control circuit and after the time period, the switchable load from consuming the first output from the first stage power converter.

14. (Currently Amended) The method of claim 13, further comprising:
signaling, by the control circuit, the switchable load to be in a first state of consuming the portion of the first output during the time period; and
signaling, by the control circuit, the switchable load to be in a [[a]] second state of not consuming the first output from the first stage power converter after the time period.
15. (Original) The method of claim 14, wherein, when the switchable load is in the second state, the voltage above the threshold is sufficient to power the second stage power converter to operate the micro-controller for at least a predetermined period of time during which the direct current input to the first stage power converter has diminishing power.
16. (Original) The method of claim 14, wherein the switchable load includes a resistive device, and a switching device connected to the resistive device; wherein the method further includes:
turning on the switching device to place the switchable load in the first state in which the resistive device is connected to the first output; and
turned off the switching device to place the switchable load in the second state in which the resistive device is disconnected from the first output.
17. (Original) The method of claim 14, further comprising:
delaying, by the control circuit, a first signal instructing the switching device to change from the first state to the second state; and
generating, via the delaying, a second delayed signal that instructs the second stage power converter to change from not powering the micro-controller to powering

the micro-controller.

18. (Original) The method of claim 17, further comprising:
generating the first signal using a hysteresis amplifier coupled to the first output.

19-20. (Canceled)

REMARKS

The foregoing amendment and the following arguments are provided generally to impart precision to the claims, by more particularly pointing out the invention, rather than to avoid prior art.

Allowable Subject Matter

Applicant thanks the examiner for pointing out the allowable subject matters in claims 5-9 and 13-18. Claims 5 and 13 are amended to be in an independent form. Claims 2, 6-9, 12 and 14-18 depend from claims 5 and 13. Claims 1, 3-4, 10-11 and 19-20 are canceled. Thus, the application is now in order for allowance. Accordingly, reconsideration of the application and allowance thereof is courteously solicited.

Authorization is hereby provided to charge any fees which may be required for the present filing, or credit any overpayment, to Deposit Account No. 50-2638.

Respectfully submitted,

Date: January 3, 2019

/Lehua Wang/

Lehua Wang

Reg. No. 48,023

GREENBERG TRAURIG, LLP

CUSTOMER NUMBER **64494**

Phone: (650) 328-8500

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Mordechay Avrutsky	Examiner:	Jeffrey Gblende
Serial No.:	15/969,607	Group Art Unit:	2838
Filed:	May 2, 2018	Confirmation:	3731
Title:	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		

TRANSMITTAL FOR INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir/Madam:

According to 37 C.F.R. §1.98(d), copies of the Foreign Patent Documents and Non-Patent Literature Documents listed in the Information Disclosure Statement Form (SB08) filed herewith are not required in the Information Disclosure Statement filed in the present application, because these documents have been submitted in U.S. Pat. App. Ser. Nos. 15/392,960, 14/822,227, and/or 12/787,205, which applications are relied upon in the present application for an earlier effective filing date under 35 U.S.C. §120.

Consideration of the references listed in the Information Disclosure Statement Form (SB08) filed herewith is respectfully requested.

Respectfully submitted,

Date: January 3, 2019

/Lehua Wang/
Lehua Wang
Reg. No. 48,023

GREENBERG TRAURIG, LLP
CUSTOMER NUMBER **64494**
Phone: (650) 328-8500
Fax: (650) 328-8508

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15969607
	Filing Date	2018-05-02
	First Named Inventor	MORDECHAY AVRUTSKY
	Art Unit	2838
	Examiner Name	GBLENDE, JEFFREY A
	Attorney Docket Number	108144-201504/US (TGY015)

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Art Unit	2838	
Examiner Name	GBLENDE, JEFFREY A	
Attorney Docket Number	108144-201504/US (TGY015)	

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Art Unit	2838	
Examiner Name	GBLENDE, JEFFREY A	
Attorney Docket Number	108144-201504/US (TGY015)	

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Examiner Name	GBLENDE, JEFFREY A	
Attorney Docket Number	108144-201504/US (TGY015)	

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Attorney Docket Number	108144-201504/US (TGY015)

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
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Art Unit	2838
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Attorney Docket Number	108144-201504/US (TGY015)

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Examiner Signature		Date Considered	
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Filing Date	2018-05-02
First Named Inventor	MORDECHAY AVRUTSKY
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Examiner Name	GBLENDE, JEFFREY A
Attorney Docket Number	108144-201504/US (TGY015)

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Filing Date	2018-05-02
First Named Inventor	MORDECHAY AVRUTSKY
Art Unit	2838
Examiner Name	GBLENDE, JEFFREY A
Attorney Docket Number	108144-201504/US (TGY015)

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Lehua Wang/	Date (YYYY-MM-DD)	2019-01-03
Name/Print	Lehua Wang	Registration Number	48,023

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Inventor:	Mordechay Avrutsky	Examiner:	Jeffrey Gblende
Serial No.:	15/969,607	Group Art Unit:	2838
Filed:	May 2, 2018	Confirmation:	3731
Title:	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		

NOTICE OF RELATED APPLICATIONS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir/Madam:

Applicant is hereby providing notice that the subject patent application is related to the following U.S. patent applications. Applicant respectfully requests the Examiner to consider the related applications and the prosecution histories of these related applications, such as the current claims, Office Actions and Notices of Allowance, etc.

1.	Title:	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module	
	Serial No.:	12/787,205	Filed on: May 25, 2010
	Inventor(s):	Mordechay AVRUTSKY	Docket No.: 108144-201501/US (TGY015)
	Examiner:	Jeffrey Gblende	Art Unit: 2838
	Patent No.:	9,143,036	Issue Date: September 22, 2015

2.	Title:	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module	
	Serial No.:	14/822,227	Filed on: August 10, 2015
	Inventor(s):	Mordechay AVRUTSKY	Docket No.: 108144-201502/US (TGY015)
	Examiner:	Jeffrey Gblende	Art Unit: 2838
	Patent No.:	9,584,021	Issue Date: February 28, 2017

3. Title: Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module

Serial No.: 15/392,960

Filed on: December 28, 2016

Inventor(s): Mordechay AVRUTSKY

Docket No.: 108144-201503/US
(TGY015)

Examiner: Jeffrey Gblende

Art Unit: 2838

Patent No.: 9,966,848

Issue Date: May 8, 2018

Respectfully submitted,

Date: January 3, 2019

/Lehua Wang/

Lehua Wang

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Phone: (650) 328-8500

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Electronic Patent Application Fee Transmittal

Application Number:	15969607			
Filing Date:	02-May-2018			
Title of Invention:	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module			
First Named Inventor/Applicant Name:	Mordechay AVRUTSKY			
Filer:	Lehua Wang			
Attorney Docket Number:	108144-201504/US (TGY015)			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	120	120
Total in USD (\$)				120

Electronic Acknowledgement Receipt

EFS ID:	34755334
Application Number:	15969607
International Application Number:	
Confirmation Number:	3731
Title of Invention:	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module
First Named Inventor/Applicant Name:	Mordechay AVRUTSKY
Customer Number:	64494
Filer:	Lehua Wang
Filer Authorized By:	
Attorney Docket Number:	108144-201504/US (TGY015)
Receipt Date:	03-JAN-2019
Filing Date:	02-MAY-2018
Time Stamp:	17:39:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 120
RAM confirmation Number	010419INTEFSW00004221502638
Deposit Account	502638
Authorized User	Lehua Wang

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

Page 66 of 140 SMA Solar Technology America, LLC, Ex. 1006

37 CFR 1.19 (Document supply fees)
 37 CFR 1.20 (Post Issuance fees)
 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		108144-201504_ROA_2018-10-18.pdf	101094 62ac5635f0801c3610154fd443d3c1d83492ba0e	yes	6
Multipart Description/PDF files in .zip description					
	Document Description		Start	End	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	1	
	Claims		2	5	
	Applicant Arguments/Remarks Made in an Amendment		6	6	
Warnings:					
Information:					
2	Transmittal Letter	108144-201504_IDSTransmittal.pdf	84314 7252b7b0f35dae0f92214ea8e1a10db4c8d71b19	no	1
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	108144-201504_IDS_2019-01-03.pdf	614910 cc067df1034eec76a7d62870deefa61dfd32fd7f	no	12
Warnings:					
Information:					
4	Other Reference-Patent/App/Search documents	108144-201504_Related.pdf	86568 461f1088ce8487ddc7bd8e9096b3a7927935dae6	no	2
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30982 e03acf88f7866eebbbc7c00339c94cb724d602eeb	no	2
Page 67 of 140		SMA Solar Technology America, LLC, Ex. 1006			

Warnings:	
Information:	
Total Files Size (in bytes):	917868
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.	

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/969,607	Filing Date 05/02/2018	☐ To be Mailed
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ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO**APPLICATION AS FILED – PART I**

(Column 1)

(Column 2)

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1)

(Column 2)

(Column 3)

AMENDMENT	01/03/2019	CLAIMS REMAINING AFTER AMENDMENT	Minus	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 13	Minus	** 20	= 0	X \$50 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0	X \$230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
TOTAL ADD'L FEE						0	

(Column 1)

(Column 2)

(Column 3)

AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	Minus	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =
	☐ Application Size Fee (37 CFR 1.16(s))					
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
TOTAL ADD'L FEE						

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
TRACEY HARRIS

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/969,607	05/02/2018	Mordechay AVRUTSKY	108144-201504/ US (TGY015)	3731
64494	7590	10/18/2018	EXAMINER	
GREENBERG TRAURIG, LLP (SV)			GBLENDE, JEFFREY A	
c/o: Greenberg Traurig LLP - Chicago Office			ART UNIT	
77 West Wacker Drive, Suite 3100			PAPER NUMBER	
Intellectual Property Department			2838	
Chicago, IL 60601			NOTIFICATION DATE	
			DELIVERY MODE	
			10/18/2018	
			ELECTRONIC	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

clairt@gtlaw.com
gtipmail@gtlaw.com
rupickd@gtlaw.com

DETAILED ACTION

1. This action is in response to the application filed on 5/2/2018.

Notice of Pre-AIA or AIA Status

2. The present application is being examined under the pre-AIA first to invent provisions.

Claim Rejections - 35 USC § 103

3. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

4. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3 and 10-12 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Xu (US 2007/0001653) in view of Hwang (US Patent 5565761).

Regarding claims 1 and 10, Xu discloses (see fig. 2) an apparatus, comprising: a micro-controller (14); a first stage power converter (104) to generate a first output from a

direct current input (operation of 104); and a second stage power converter (106) connected to the first stage power converter (connection of 106) and configured to convert the first output to a second output (operation of 106).

Xu does not disclose a control circuit powered by the first output; wherein the control circuit is configured to block the second stage power converter from powering the micro-controller using the second output in a time period that is after the control circuit is powered by the first output and before a predefined condition is met in the control circuit.

Hwang discloses (see fig. 12 and 13A-13B) a control circuit (dc ok comparator) powered by a first output (connection to output from first stage); wherein the control circuit is configured to block a second stage power converter from powering a load using the second output (see abstract) in a time period that is after the control circuit is powered by the first output (see abstract, operation of dc ok comparator connected to the first output) and before a predefined condition is met in the control circuit (see abstract).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Xu to include the features of Hwang because it's used as a means to increase operational efficiencies.

Regarding claims 2 and 11-12, Xu does not disclose a power absorption circuit powered by the first output during the time period; wherein the predefined condition includes a voltage of the first output reaching a threshold; and wherein after the time period, the control circuit stops the power absorption circuit from consuming the first output from the first stage power converter.

Hwang discloses (see fig. 12 and 13A-13B) a power absorption circuit powered by the first output during the time period (C1 being powered by the first output); wherein the predefined condition includes a voltage of the first output reaching a threshold (see Abstract); and wherein after the time period, the control circuit (dc ok comparator) stops the power absorption circuit from consuming the first output from the first stage power converter (dc ok comparator allowing the second stage to operate, thus stopping C1 from consuming the first output).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Xu to include the features of Hwang because it's used as a means to increase operational efficiencies.

Regarding claim 3, Xu discloses (see fig. 2) an apparatus, comprising: a micro-controller (14).

Xu does not disclose that the power absorption circuit comprises a capacitor coupled to the first output; and when the voltage is above the threshold, the capacitor has sufficient energy to power the second stage power converter to operate the micro-controller for at least a predetermined period of time, in absence of power input from the first stage power converter during the predetermined period of time.

Hwang discloses (see fig. 12 and 13A-13B) that the power absorption circuit comprises a capacitor coupled to the first output (connection of C1 to the output of the first stage); and when the voltage is above the threshold, the capacitor has sufficient energy to power the second stage power converter to operate the load for at least a predetermined period of time, in absence of power input from the first stage power converter during the predetermined period of time (see Abstract).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Xu to include the features of Hwang because it's used as a means to increase operational efficiencies.

6. Claims 4 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Xu (US 2007/0001653) in view of Hwang (US Patent 5565761) and Lou et al. (US 2007/0278861).

Regarding claim 4, Xu does not disclose that the power absorption circuit comprises a switchable load.

Lou et al. discloses (see fig. 4) that a power absorption circuit comprises a switchable load (SW and 430).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the power supply of Xu to include the control circuit of Lou et al. because it's used in efficiently regulating power based on circuit conditions.

7. Claims 19-20 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Xu (US 2007/0001653) in view of Hwang (US Patent 5565761) and Besser et al. (US 2008/0179949).

Regarding claim 19, Xu discloses (see fig. 2) a power supply in a solar electric production system, the power supply comprising: a micro-controller (14); a first stage power converter (104) having: an input connected to a first voltage from a dc source (connection to Vin); and an output providing a second voltage different from the first

voltage from dc source (output from 104); and a second stage power converter (106) connected to the output of the first stage power converter (connection to the output of 104) and configured to supply power at a third voltage to the micro-controller (output of 106 to 14);

Xu does not disclose a photovoltaic panel, a control circuit powered by the output of the first stage power converter, wherein the control circuit is configured to block the second stage power converter from powering the micro-controller at the third voltage in a time period that is after the control circuit is powered by the output of the first stage power converter and before a predefined condition is met in the power supply.

Besser et al. teaches (see fig. 8) a power supply for use in a solar electric production system comprising an input from a photovoltaic panel (32).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the power supply of Xu to include the power supply of Besser et al. because a photovoltaic source is a cost effective method of implementing a power source.

Hwang discloses (see fig. 12 and 13A-13B) a control circuit (dc ok comparator) powered by an output of a first stage power converter (connection of dc ok comparator), wherein the control circuit is configured to block a second stage power converter from powering a load at a third voltage (see abstract) in a time period that is after the control circuit is powered by the output of the first stage power converter (connection of dc ok comparator to output of first converter. See abstract) and before a predefined condition is met in the power supply (see abstract).

Therefore it would have been obvious to one having ordinary skill in the art at the

time the invention was made to modify the apparatus of Xu to include the features of Hwang because it's used as a means to increase operational efficiencies.

Regarding claim 20, Xu discloses (see fig. 2) the first stage power converter (104) is a first step-down converter, and the second stage power converter (106) is a second step-down converter.

Allowable Subject Matter

8. Claims 5-9 and 13-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Yang (US 2005/0099164) discloses a PFC-PWM controller having interleaved switching.

Martin et al. (US 2009/0067208) discloses a method and apparatus for providing power.

Jurasek et al. (US 2009/0237146) discloses dynamic voltage pump circuit and method of dynamically generating an output supply voltage thereof.

Chen et al. (US 2009/0134858) discloses a voltage regulating apparatus and method and voltage regulator thereof.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFREY A GBLENDE whose telephone number is (571)270-5472. The examiner can normally be reached on M-F 9am-5pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Monica Lewis can be reached on 571-272-1838. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JEFFREY A GBLENDE/
Primary Examiner, Art Unit 2838

<i>Notice of References Cited</i>	Application/Control No. 15/969,607		Applicant(s)/Patent Under Reexamination	
	Examiner JEFFREY A GBLENDE		Art Unit 2838	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20050099164-A1	05-2005	Yang, Ta-Yung	H02M1/4225	323/266
*	B	US-20090067208-A1	03-2009	Martin; Donald Corey	H02J17/00	363/126
*	C	US-20090237146-A1	09-2009	Jurasek; Ryan Andrew	H02M3/07	327/536
*	D	US-20090134858-A1	05-2009	CHEN; Yi-Huei	G05F1/56	323/282
*	E	US-20070001653-A1	01-2007	Xu; Peng	H02M3/158	323/225
*	F	US-5565761-A	10-1996	Hwang; Jeffrey H.	H02M1/4208	323/222
*	G	US-20080179949-A1	07-2008	Besser; David A.	H02J7/0068	307/24
*	H	US-20070278861-A1	12-2007	Lou; Chih-Hong	G05F1/56	307/66
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes 	Application/Control No. 15/969,607	Applicant(s)/Patent Under Reexamination AVRUTSKY, Mordechay
	Examiner JEFFREY A GBLENDE	Art Unit 2838

CPC - Searched*		
Symbol	Date	Examiner
See attached EAST search history	10/15/2018	JG

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventor name search	10/15/2018	JG
See attached EAST search history	10/15/2018	JG

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/JEFFREY A GBLENDE/ Primary Examiner, Art Unit 2838	
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Bibliographic Data

Application No: 15/969,607

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☒ No ☐ Met After Allowance

Verified and Acknowledged: /JEFFREY A GBLENDE/

Examiner's Signature

Initials

Title:

Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
05/02/2018	323	2838	108144-201504/US (TGY015)
RULE			

APPLICANTS

Tigo Energy, Inc., Los Gatos, CA,

INVENTORS

Mordechay AVRUTSKY Alfei Menashe, ISRAEL

CONTINUING DATA

This application is a CON of 15392960 12/28/2016 PAT 9966848

15392960 is a CON of 14822227 08/10/2015 PAT 9584021

14822227 is a CON of 12787205 05/25/2010 PAT 9143036

12787205 has PRO of 61336743 01/26/2010

12787205 has PRO of 61275734 09/02/2009

FOREIGN APPLICATIONS

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Intellectual Property Department

Chicago, IL 60601

UNITED STATES

FILING FEE RECEIVED

\$785

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	65548	(switch\$4 near2 load)	US-PGPUB; USPAT; USOCR	OR	OFF	2018/10/11 18:32
L2	690177	first near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 18:37
L3	553381	second near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 18:37
L4	104148	(G05F1/00 G05F1/10 G05F1/12 G05F1/46 G05F1/455 G05F1/45 G05F1/445 H02M5/2573 G05F1/66 H02M1/081 H02M5/293 H02M7/12 H05B39/048 B23K11/24 G05F1/40 G05F1/42 G05F1/44 G05F1/462 G05F1/52 G05F1/56 H02M3/10 H02M3/125 H02M3/13 H02M3/135 H02M3/145 H02M3/15 H02M3/155 H02M3/156 H02M3/158 H02M3/1588 H02M2003/1566 H02M3/1582 H02M2003/1557 H04B2215/069 G05F3/10 G05F3/16 G05F3/18 G05F3/185 G05F3/20 G05F3/26 G05F3/30 G05F3/205 G05F3/22 G05F3/24 G05F3/222 G05F3/242 G05F3/225 G05F3/227 G05F3/245 G05F3/247 G05F3/262 G05F3/265 G05F3/267).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 18:44
L5	104148	L4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 18:44
L6	351	1 same 2 same 3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 18:44

L7	63	6 and 4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 18:44
L8	553381	second near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 19:24
L9	6964	(de\$1activat\$3 or dis\$1abl\$3 or prevent\$3 or inhibit\$3 or block\$3) near2 L8	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 19:24
L10	14213280	(reference or threshold)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 19:24
L11	749	L9 same L10	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 19:24
L12	28	1 and L11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 19:24
S1	47	((("AVRUTSKY") near3 ("Mordechay"))).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/10/10 10:18
S2	4	("5565761").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:20
S3	3	("20070001653").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:20
S4	104126	(G05F1/00 G05F1/10 G05F1/12 G05F1/46 G05F1/455 G05F1/45	US-PGPUB; USPAT;	OR	OFF	2018/10/10 10:24

		G05F1/445 H02M5/2573 G05F1/66 H02M1/081 H02M5/293 H02M7/12 H05B39/048 B23K11/24 G05F1/40 G05F1/42 G05F1/44 G05F1/462 G05F1/52 G05F1/56 H02M3/10 H02M3/125 H02M3/13 H02M3/135 H02M3/145 H02M3/15 H02M3/155 H02M3/156 H02M3/158 H02M3/1588 H02M2003/1566 H02M3/1582 H02M2003/1557 H04B2215/069 G05F3/10 G05F3/16 G05F3/18 G05F3/185 G05F3/20 G05F3/26 G05F3/30 G05F3/205 G05F3/22 G05F3/24 G05F3/222 G05F3/242 G05F3/225 G05F3/227 G05F3/245 G05F3/247 G05F3/262 G05F3/265 G05F3/267).CPC.	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S5	63367	(H02M3/1582 H02M3/1584 H02M3/285 H02M3/33561 H02M7/49 H02J3/46 H02J3/38 H02M1/045 H02M7/006 H02M7/06 H02M7/068 H02M7/153 H02M7/10 H02M1/088 H02M7/103 H02M7/106 H02M7/19 H02M7/08 H02M7/17 H02M2001/007 H02M7/493 H02M7/53806 H02M7/5381).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:24
S6	13193	S4 and S5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:24
S7	553172	second near2 (stage or converter or regulator)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:59
S8	6962	(de\$1activat\$3 or dis\$1abl\$3 or prevent\$3 or inhibit\$3 or block\$3) near2 S7	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 10:59
S9	14206786	(reference or threshold)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:00
S10	749	S8 same S9	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2018/10/10 11:01

			IBM_TDB			
S11	23	S6 and S10	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:01
S12	74	S10 and S4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:02
S13	51	S12 not S11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:02
S14	54	S10 and S5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:05
S15	31	S14 not S11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 11:05
S16	33	"5995385"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/10 14:42
S17	2	("20070278861").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/10/11 09:00

EAST Search History (Interference)

<This search history is empty>

10/ 11/ 2018 7:59:11 PM

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United States Patent and Trademark Office
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/969,607	05/02/2018	Mordechay AVRUTSKY	108144-201504/US (TGY015)

CONFIRMATION NO. 3731

64494
GREENBERG TRAUIG, LLP (SV)
c/o: Greenberg Traurig LLP - Chicago Office
77 West Wacker Drive, Suite 3100
Intellectual Property Department
Chicago, IL 60601

PUBLICATION NOTICE



OC000000102117981

Title: Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module

Publication No. US-2018-0254701-A1

Publication Date: 09/06/2018

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <https://portal.uspto.gov/pair/PublicPair>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/969,607	05/02/2018	2631	785	108144-201504/US (TGY015)	20	3

CONFIRMATION NO. 3731

FILING RECEIPT



0000000099896820

64494
GREENBERG TRAURIG, LLP (SV)
c/o: Greenberg Taurig LLP - Chicago Office
77 West Wacker Drive, Suite 3100
Intellectual Property Department
Chicago, IL 60601

Date Mailed: 05/31/2018

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Mordechay AVRUTSKY, Alfei Menashe, ISRAEL;

Applicant(s)

Tigo Energy, Inc., Los Gatos, CA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 15/392,960 12/28/2016 PAT 9966848
which is a CON of 14/822,227 08/10/2015 PAT 9584021
which is a CON of 12/787,205 05/25/2010 PAT 9143036
which claims benefit of 61/275,734 09/02/2009
and claims benefit of 61/336,743 01/26/2010

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 05/30/2018

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/969,607**

Projected Publication Date: 09/06/2018

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module

Preliminary Class

375

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/969,607				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	330		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	20	minus 20 = *	x 50 =	0.00	OR					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *	x 230 =	0.00						
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00						
			TOTAL	785		TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										

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FEE TRANSMITTAL		Complete if known	
		Application Number	
		Filing Date	2018-05-02
☒ Applicant asserts small entity status. See 37 CFR 1.27.		First Named Inventor	Mordechay AVRUTSKY
☐ Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.		Examiner Name	
		Art Unit	
TOTAL AMOUNT OF PAYMENT	(\$) 785	Practitioner Docket No.	108144-201504/US (TGY015)

METHOD OF PAYMENT (check all that apply)
☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☒ Deposit Account Deposit Account Number: 50-2638 Deposit Account Name: _____

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☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**
☒ Charge any additional fee(s) or underpayment of fee(s) ☐ Credit any overpayment of fee(s) under 37 CFR 1.16 and 1.17

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FEE CALCULATION**1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)**

Application Type	FILING FEES			SEARCH FEES			EXAMINATION FEES			Fees Paid (\$)
	U (\$)	S (\$)	M (\$)	U (\$)	S (\$)	M (\$)	U (\$)	S (\$)	M (\$)	
Utility	300	150*	75	660	330	165	760	380	190	785
Design	200	100	50	160	80	40	600	300	150	
Plant	200	100	50	420	210	105	620	310	155	
Reissue	300	150	75	660	330	165	2,200	1,100	550	
Provisional	280	140	70	0	0	0	0	0	0	

* The \$150 small entity status filing fee for a utility application is further reduced to \$75 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	Undiscounted Fee (\$)	Small Entity Fee (\$)	Micro Entity Fee (\$)
Each claim over 20 (including Reissues)	100	50	25
Each independent claim over 3 (including Reissues)	460	230	115
Multiple dependent claims	820	410	205
Total Claims			
-20 or HP = _____ x _____ = _____			
HP = highest number of total claims paid for, if greater than 20.			
Indep. Claims			
-3 or HP = _____ x _____ = _____			
HP = highest number of independent claims paid for, if greater than 3.			

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$400 (\$200 for small entity) (\$100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
_____ - 100 = _____ / 50 = _____ (round up to a whole number) x _____ = _____				

4. OTHER FEE(S)

Non-English specification, \$130 fee (no small or micro entity discount)

Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, \$400 fee (\$200 small or micro entity)

Other (e.g., late filing surcharge): _____

SUBMITTED BY			
Signature	/Lehua Wang/	Registration No. (Attorney/Agent)	48023
Name (Print/Type)	Lehua Wang	Telephone	650-328-8500
		Date	2018-05-02

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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FEE TRANSMITTAL		Complete if known	
		Application Number	
		Filing Date	2018-05-02
☒ Applicant asserts small entity status. See 37 CFR 1.27.		First Named Inventor	Mordechay AVRUTSKY
☐ Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.		Examiner Name	
		Art Unit	
TOTAL AMOUNT OF PAYMENT	(\$) 785	Practitioner Docket No.	108144-201504/US (TGY015)

METHOD OF PAYMENT (check all that apply)
☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☒ Deposit Account Deposit Account Number: 50-2638 Deposit Account Name: _____

For the above-identified deposit account, the Director is hereby authorized to (check all that apply):

☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**
☒ Charge any additional fee(s) or underpayment of fee(s) ☐ Credit any overpayment of fee(s) under 37 CFR 1.16 and 1.17

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FEE CALCULATION**1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)**

Application Type	FILING FEES			SEARCH FEES			EXAMINATION FEES			Fees Paid (\$)
	U (\$)	S (\$)	M (\$)	U (\$)	S (\$)	M (\$)	U (\$)	S (\$)	M (\$)	
Utility	300	150*	75	660	330	165	760	380	190	785
Design	200	100	50	160	80	40	600	300	150	
Plant	200	100	50	420	210	105	620	310	155	
Reissue	300	150	75	660	330	165	2,200	1,100	550	
Provisional	280	140	70	0	0	0	0	0	0	

* The \$150 small entity status filing fee for a utility application is further reduced to \$75 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	Undiscounted Fee (\$)	Small Entity Fee (\$)	Micro Entity Fee (\$)
Each claim over 20 (including Reissues)	100	50	25
Each independent claim over 3 (including Reissues)	460	230	115
Multiple dependent claims	820	410	205
Total Claims			
-20 or HP = _____ x _____ = _____			
HP = highest number of total claims paid for, if greater than 20.			
Indep. Claims			
-3 or HP = _____ x _____ = _____			
HP = highest number of independent claims paid for, if greater than 3.			

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$400 (\$200 for small entity) (\$100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
_____ - 100 = _____ / 50 = _____ (round up to a whole number) x _____ = _____				

4. OTHER FEE(S)

Non-English specification, \$130 fee (no small or micro entity discount)

Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, \$400 fee (\$200 small or micro entity)

Other (e.g., late filing surcharge): _____

SUBMITTED BY			
Signature	/Lehua Wang/	Registration No. (Attorney/Agent) 48023	Telephone 650-328-8500
Name (Print/Type)	Lehua Wang	Date 2018-05-02	

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:

Filing Date:

Title of Invention:

Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module

First Named Inventor/Applicant Name:

Mordechay AVRUTSKY

Filer:

John Patrick Ward/Junchao Zhang

Attorney Docket Number:

108144-201504/US (TGY015)

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380

Pages:

Claims:

Miscellaneous-Filing:

Petition:

Patent-Appeals-and-Interference:

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				785

Electronic Acknowledgement Receipt

EFS ID:	32516563
Application Number:	15969607
International Application Number:	
Confirmation Number:	3731
Title of Invention:	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module
First Named Inventor/Applicant Name:	Mordechay AVRUTSKY
Customer Number:	64494
Filer:	John Patrick Ward/Junchao Zhang
Filer Authorized By:	John Patrick Ward
Attorney Docket Number:	108144-201504/US (TGY015)
Receipt Date:	02-MAY-2018
Filing Date:	
Time Stamp:	18:24:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$785
RAM confirmation Number	050318INTEFSW00004934502638
Deposit Account	502638
Authorized User	Junchao Zhang

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.18 (Patent application and reexamination processing fees)

Page 98 of 140 SMA Solar Technology America, LLC, Ex. 1006

37 CFR 1.19 (Document supply fees)
 37 CFR 1.20 (Post Issuance fees)
 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	108144-201504_ADS.pdf	1792973	no	9
			94bd830c378dcb2c3166cfe3325eab92a4dc9e9e		
Warnings:					
Information:					
2	Oath or Declaration filed	108144-201504_Dec.PDF	179168	no	2
			f358bdf8ddf79a49928369fc4c47eb7ad0a451bd		
Warnings:					
Information:					
3		108144-201504_Description.pdf	124181	yes	23
			2d87369908b5090ecce6a1bc35524034fd258a0		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	17	
	Claims		18	22	
	Abstract		23	23	
Warnings:					
Information:					
4	Drawings-only black and white line drawings	108144-201504_Figures.pdf	224204	no	6
			9aaa5fd9211774c85130b745af86653aaf9e5356		
Warnings:					
Information:					
5	Miscellaneous Incoming Letter	108144-201504_FeeTransmittal.pdf	210441	no	2
			440c132ed4d899256ae3d0af6115810f440ef3cf		
Page 99 of 140		SMA Solar Technology America, LLC, Ex. 1006			

Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	35522	no	2
			a986c0cb9f603804f40e9ae8f5a07eab30130514		
Warnings:					
Information:					
Total Files Size (in bytes):			2566489		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	108144-201504/US (TGY015)
		Application Number	
Title of Invention	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor	1				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Mordechay		AVRUTSKY		
Residence Information (Select One) US Residency • Non US Residency Active US Military Service					
City	Alfei Menashe		Country of Residence ⁱ	L	
Mailing Address of Inventor:					
Address 1	20 Arbel Street				
Address 2					
City	Alfei Menashe		State/Province		
Postal Code	44851	Country ⁱ	IL		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
☐ An Address is being provided for the correspondence Information of this application.			
Customer Number	64494		
Email Address	gtipmail@gtlaw.com	Add Email	Remove Email
Email Address	clairt@gtlaw.com	Add Email	Remove Email
Email Address	rupickd@gtlaw.com		Remove Email

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	108144-201504/US (TGY015)
		Application Number	
Title of Invention	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		

Application Information:

Title of the Invention	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		
Attorney Docket Number	108144-201504/US (TGY015)	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	6	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐ Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:			
☒ Customer Number		☐ US Patent Practitioner	
☐ Limited Recognition (37 CFR 11.9)			
Customer Number	64494		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	108144-201504/US (TGY015)
		Application Number	
Title of Invention	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	15392960	2016-12-28		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15392960	Continuation of	14822227	2015-08-10	9584021	2017-02-28
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14822227	Continuation of	12787205	2010-05-25	9143036	2015-09-22
Prior Application Status	Expired		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12787205	Claims benefit of provisional	61275734	2009-09-02		
Prior Application Status	Expired		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12787205	Claims benefit of provisional	61336743	2010-01-26		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)¹ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	108144-201504/US (TGY015)
		Application Number	
Title of Invention	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		

		Remove	
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐	This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.
--------------------------	---

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	108144-201504/US (TGY015)
	Application Number	
Title of Invention	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	108144-201504/US (TGY015)
		Application Number	
Title of Invention	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant	1	Remove
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.		
Clear		
☒ Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		
Name of the Deceased or Legally Incapacitated Inventor:		
If the Applicant is an Organization check here. ☒		
Organization Name	Tigo Energy, Inc.	
Mailing Address Information For Applicant:		
Address 1	420 Blossom Hill Road	
Address 2		
City	Los Gatos	State/Province
Country	US	Postal Code
Phone Number		Fax Number
Email Address		
Additional Applicant Data may be generated within this form by selecting the Add button. Add		

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	108144-201504/US (TGY015)
		Application Number	
Title of Invention	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		

Assignee	1			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
				Remove
If the Assignee or Non-Applicant Assignee is an Organization check here.				☐
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country ⁱ		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.				Add

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Lehua Wang/		Date (YYYY-MM-DD)	2018-05-02
First Name	Lehua	Last Name	Wang	Registration Number
				48023
Additional Signature may be generated within this form by selecting the Add button.				Add

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	108144-201504/US (TGY015)
		Application Number	
Title of Invention	Systems and Methods for Enhanced Efficiency Auxiliary Power Supply Module		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of
Invention

**SYSTEMS AND METHODS FOR ENHANCED EFFICIENCY AUXILIARY POWER
SUPPLY MODULE**

As the below named inventor, I hereby declare that:

This declaration
is directed to:



The attached application, or



United States application or PCT international application number 14/822,227

filed on August 10, 2015

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001
by fine or imprisonment of not more than five (5) years, or both.

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LEGAL NAME OF INVENTOR

Inventor: MORDECHAY AVRUTSKY

Date (Optional) 08/28/2015

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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PATENT APPLICATION
FOR
**SYSTEMS AND METHODS FOR ENHANCED EFFICIENCY AUXILIARY
POWER SUPPLY MODULE**

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**SYSTEMS AND METHODS FOR ENHANCED EFFICIENCY AUXILIARY POWER
SUPPLY MODULE**

RELATED APPLICATIONS

[0001] The present application is a continuation application of U.S. Pat. App. Ser. No. 15/392,960, filed Dec. 28, 2016 and issued as U.S. Pat. No. 9,966,848 on May 8, 2018, which is a continuation application of U.S. Pat. App. Ser. No. 14/822,227, filed Aug. 10, 2015, and issued as U.S. Pat. No. 9,584,021 on Feb. 28, 2017, which is a continuation application of U.S. Pat. App. Ser. No. 12/787,205, filed May 25, 2010 and issued as U.S. Pat. No. 9,143,036 on Sep. 22, 2015, which claims the benefit of filing dates of Prov. U.S. App. Ser. No. 61/275,734, filed Sep. 2, 2009, and Prov. U.S. App. Ser. No. 61/336,743, filed Jan. 26, 2010, the entire disclosures of which applications are hereby incorporated herein by reference.

FIELD OF THE TECHNOLOGY

[0002] At least some embodiments of this disclosure relate to photovoltaic systems in general, and more particularly but not limited to, enhancing the efficiency for auxiliary power supply modules used in photovoltaic systems.

BACKGROUND

[0003] Typically, power supplies or power supply modules used for photovoltaic systems may provide, for example, 3.3V to be used as a main supply voltage, in most applications when the photovoltaic system needs to maintain low voltage for energy-saving purposes. However, when the power supplies are driving the metal-oxide-semiconductor field-effect transistors (MOSFET) or similar devices or switches contained within the photovoltaic systems, the power supplies or power supply modules of photovoltaic systems may have to provide higher voltage levels such as, for example, 10V to 12V. Keeping the main supply of the control circuit and the overall power supply module at, for example, 3.3V may be preferable in order to maintain ideal energy-savings for the operation of photovoltaic systems.

SUMMARY OF THE DESCRIPTION

[0004] Systems and methods in accordance with the present disclosure are described herein. Some embodiments are summarized in this section.

[0005] In one of many embodiments of the disclosure, provided is a power supply for use in a solar electric production system. The power supply includes: a first stage having an input connected to a voltage from a photovoltaic panel and an output providing a first voltage different from the voltage from the photovoltaic panel; and a second stage connected to the output of the first stage, the second stage supplying power at a second voltage to a micro-controller, where the output of the first stage is turned on and stable for a period of time before the second stage is turned on to supply the power at the second voltage to the micro-controller.

[0006] In another embodiment, provided is a power supply for use in a solar electric production system. The power supply includes: a first stage having an input and an output, the input of the first stage to receive power from a photovoltaic panel, the output of the first stage to provide a first voltage different from the voltage received at the input of the first stage; a switchable load; a second stage having an input connected to the output of the first stage, the second stage to supply power at a second voltage to an micro-controller; and a control circuit to provide a signal to the switchable load to switch off the switchable load prior to providing a signal to the second stage to enable output from the second stage to the micro-controller.

[0007] Other embodiments and features of the present disclosure will be apparent from the accompanying drawings and from the detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The embodiments are illustrated by way of example and not limitation in the figures of the accompanying drawings in which like references indicate similar elements.

[0009] **Figure 1** shows an example gate charge vs. gate-to-source voltage diagram according to an embodiment of the present disclosure.

[0010] **Figure 2** shows a diagram illustrating RDSON behavior as a function of VGS (voltage between gate and source of a FET) according to an embodiment of the present

disclosure.

[0011] **Figure 3** shows a schematic description of an auxiliary circuit according to an embodiment of the present disclosure.

[0012] **Figure 4** shows a schematic description of a circuit practicing a system and method according to an embodiment of the present disclosure.

[0013] **Figure 5** shows a schematic description of an example startup behavior of wave forms, according to an embodiment of the present disclosure.

[0014] **Figure 6** shows a power supply according to one embodiment.

DETAILED DESCRIPTION

[0015] The following description and drawings are illustrative and are not to be construed as limiting. Numerous specific details are described to provide a thorough understanding. However, in certain instances, well known or conventional details are not described in order to avoid obscuring the description. References to one or an embodiment in the present disclosure are not necessarily references to the same embodiment; and, such references mean at least one.

[0016] Provided is a system and method for an auxiliary power supply module used in a photovoltaic system to increase the efficiency of the photovoltaic system and reduce maintenance responsibilities of the system, or housekeeping requirements, wherein housekeeping roughly means the energy, power or voltage requirements needed to operate controls and switches of a photovoltaic system that converts sunlight into electricity, as well as to manage and control directly associated tasks, including but not limited to communication operations and so on. This increase in efficiency and power savings may be achieved by designing a photovoltaic system where the efficiency curve is as flat as possible. For example, in order to achieve such efficiency objectives, an internal auxiliary power supply having reduced power consumption may be used to drive the MOSFETs of a photovoltaic system at the lower power end of the efficiency curve in order to ultimately obtain the most efficient power savings possible.

[0017] One application of the present disclosure is to power control circuits for a solar panel using the power generated by the solar panel. For example, a power supply module of one embodiment is used to power the link module (200) using the

electricity generated by the photovoltaic panel (101n) described in U.S. Pat. App. Ser. No. 11/875,799, published now as U.S. Pat. App. Pub. No. 2008/0097655. For example, a power supply module of one embodiment is used to power the local management unit (LMU) (101) using the electricity generated by the solar module (102) described in U.S. Pat. App. Ser. No. 12/411,317, now issued as U.S. Pat. No. 7,602,080. In one embodiment, a sun can be shown along with any of the above-referenced **Figures** – illustrate that the sun may be the source of photovoltaic energy absorbed by a solar panel, for instance. The contents of the above discussed patent and publication are incorporated herein by reference.

[0018] **Figure 1** shows an example gate charge vs. gate-to-source voltage diagram according to an embodiment of the present disclosure. Gate charge (QG) vs. gate-to-source voltage (VGS) diagram (100) comprises at least one drain-to-source voltage (VDS) curve (102), a gate-to-source voltage (VGS) axis (104), having a unit of measurements of Volts, and a total gate charge (QG) axis (106), having a unit of measurement of Coulombs, or capacitive charge, or in the specific case of **Figure 1**, nano-Coulombs (nC).

[0019] **Figure 1** analyzes the gate, drain and source of a typical MOSFET transistor that may be used in a photovoltaic system, for example. According to an embodiment of the present disclosure, driving the gate of the MOSFET relative to the source with a lower voltage value (low VGS values on the gate-to-source voltage axis (104)) may yield energy savings for the associated voltage drive at, for example, saving roughly twice the amount of energy compared to using high-voltage values). Note also that the slope (change in gate-to-source voltage over change in total gate charge) is slightly higher for lower values of VGS as opposed to higher values of VGS, which may mean greater power efficiency overall. Both the lowered voltage of the gate-to-source voltage VGS and the lowered internal gate capacity (which in turn reduces the charge or discharge current across the gate) result in a roughly quadratic savings of power. This power savings allows a photovoltaic system to achieve great reduction in housekeeping energy supply, by using an “adaptive” gate drive that adapts power consumption based on the amount of gate driving voltage provided. Therefore, as can be seen in **Figure 1**, the reduction in gate charge is linear in relation to the gate-to-source voltage VGS.

[0020] MOSFETs have a threshold input voltage, above which the transistor is substantially in full conduction mode or in saturation mode. For safe operation and full conduction, the minimum gate voltage should be at least 1V above the minimum threshold voltage value. Even if full saturation is not achieved, particularly at the low end of the power range, a loss in switching efficiency may be small, whereas at the same low end of the power range, housekeeping energy may suddenly become an issue. Adjusting the gate drive voltage is required to reduce the auxiliary supply current at low load conditions, whereas the effective resistance between the drain and the source of a MOSFET (RDS) has little to no influence on switching efficiency. For a MOSFET above its turn-on threshold voltage, the total gate charge value versus normal gate charge value is a straight line, as is well known in the art, meaning that the behavior per each load current exhibits constant capacitance. Therefore, the gate drive current may behave according to $\frac{1}{2}CV^2f$, where C= the equivalent capacitance, V = the gate voltage, and f= operating frequency. Thus it is clear that reducing the gate voltage from 11V to 7V may reduce the drive current by more than two orders of magnitude. At the same time that the RDSon (the resistance between the drain and the source of a MOSFET switch (or other FET switch) when fully on) is increased by less than 1.5 times its 12V value. At light load conditions (less than 30 percent of a standard-rated load) the change in RDSon does not affect the overall efficiency of the overall MOSFET transistor or of the photovoltaic system.

[0021] **Figure 2** shows a diagram illustrating RDSon behavior as a function of VGS (voltage between gate and source of a FET) according to an embodiment of the present disclosure. Drain-to-source voltage (VDS) to drain-to-source Current (ID) diagram (200) comprises at least one gate-to-source voltage (VGS) curve 202, a drain-to-source Current (ID) axis 204, and a drain-to-source voltage (VDS) axis 206. As can be seen from **Figure 2**, a gate-to-source voltage value (VGS) between 15V to 6V does not affect the resistance significantly up to a 1V drop which is the range of RDSon (the resistance between the drain and the source of a MOSFET when fully on) for the switching area. The resistance is not effected significantly up to a 1V drop because the MOSFET is in saturation mode, and because $VDS = I \cdot RDSon$ and RDSon is a function of both VGS and VDS, so when VGS changes, the RDSon value is affected. As also can be

observed from **Figure 2**, the slope (change in I_D over change in V_{DS}) increases for higher values of V_{GS} and begin to decrease and plateau for lower values of V_{GS} . This implies that there is an optimal V_{GS} value to drive the gate voltage at in order to still be efficient and not affect the range of $R_{DS(on)}$, which is desired in order to avoid any excessive power consumption from the resistance of $R_{DS(on)}$.

[0022] Further details about characteristics of MOSFETs in one embodiment (e.g., used as switches for controlling the output of solar panels) may be provided in IRF8101E/S/SLPbF data sheet from International Rectifier, which is hereby incorporated herein by reference.

[0023] **Figure 3** shows a schematic description of an auxiliary circuit according to an embodiment of the present disclosure. Auxiliary circuit (300) is a circuit designed to control the auxiliary power for a photovoltaic system, for example. In one embodiment, the auxiliary circuit (300) receives in the input terminal (333) electricity from the photovoltaic panel (101n) described in U.S. Pat. App. Ser. No. 11/875,799, or from the solar module (102) described in U.S. Pat. App. Ser. No. 12/411,317. In one embodiment, the auxiliary circuit (300) provides in one output terminal (330) a voltage for control logic, such as the link module (200) described in U.S. Pat. App. Ser. No. 11/875,799 or the controller (109) described in U.S. Pat. App. Ser. No. 12/411,317. In one embodiment, the circuit (300) provides in one output terminal (331) a voltage for driving a switch, such as a switch having characteristics shown in **Figs. 1** and **2**, which can be used as a switch in the link module (200) described in U.S. Pat. App. Ser. No. 11/875,799, or a switch (106) and/or a switch (108) described in U.S. Pat. App. Ser. No. 12/411,317.

[0024] In one embodiment, the auxiliary circuit (300) includes step-down converters, such as a buck converter (301) to drive a first voltage output (331) and a buck converter (311) to drive a second voltage output (330). The auxiliary circuit (300) uses capacitor (326) as a backup power supply in order to keep buck converter (311) running longer than buck converter (301). In other words, capacitor (326) is charged by buck converter (301) and used by buck converter (311) as a power supply such that the output of buck converter (311) lasts longer than the output of buck converter (301). If the output of buck converter (301) is out or unstable for a little while, buck converter

(311) can still keep the auxiliary circuit (300) working properly at 3.3V for this short period of power outage or instability. Thus, the control logic powered by the voltage (330) will have enough power to provide appropriate control signals, until the drive stage powered by the voltage (331) loses the power (e.g., to operate the switch for the solar panel). Utilizing capacitor (326) may be beneficial in situations where the solar panel is temporarily out of power, such as, for example, when the solar panel is covered by a falling leaf or a bird flying by or a brief shadow.

[0025] In one embodiment, auxiliary circuit (300) has input voltage (333), buck converter (301), voltage (332), MOSFET (345), drive voltage (31), resistor (319), resistor (313), capacitor (326), buck converter (311), 3.3V logic supply output (330), diode (322), resistors (323, 324, 325), transistors (320, 321), control block (315), and resistors (341, 342, 343, 340). The buck converter (301) has: MOSFET (302), diode (305), inductor (306), resistors (308, 309, 310), capacitor (307), MOSFET (303), and control (304). The buck converter (311) has: MOSFET (312), diode (325), inductor (327), capacitor (328) and control (314). Various known converters can be used to replace the voltage conversion portion of the buck converters (301 and 311), such MOSFET (302), diode (305), inductor (306) and capacitor (307) in the buck converter (301), or MOSFET (312), diode (325), inductor (327) and capacitor (328) in the buck converter (311). Therefore, the details shown in buck converter (303) and buck converter (311) are merely illustrative, and other types of buck converters known in the art may be used. In one embodiment, control block 315 has: control circuit (318), and transistors (317, 316). The control circuits 304, 314 and 318 may be interconnected via one or more control signals or connected to one source, such as a micro-controller, although this embodiment is not explicitly shown in **Figure 3**. In one embodiment, the control circuit (318) controls the operations of the control (304) and control (314).

[0026] In auxiliary circuit (300), drive voltage (331) is controlled by a serial MOSFET (345) and resistor (319). Before enabling the serial MOSFET (345), transistor (321) is to be turned on by meeting at least the following two conditions: (i) 3.3V logic supply (330), for example, is on and higher than at least, for example, 2.6V. (ii) At this particular voltage level, the threshold formed by Zener diode (322) and resistors (324) and (325), as well as when the VBE (base-emitter voltage) of transistor (321) (if

transistor (321) comprises a bipolar transistor instead of a MOSFET) activates transistor (321), thus making the control circuit (318) operative and able to control transistor (316) to change from open collector to conductive or on (if transistor (316) is a bipolar transistor, for example). Resistor (323) further enables the 3.3V logic supply (330), for example, to be used in operation with transistor (320) (transistor (320) shown as being a bipolar transistor in **Figure 3**). According to an embodiment of the present disclosure, a MOSFET is used instead of a bipolar transistor for some or all of the bipolar transistors (e.g. (321), (316), (320)) shown in **Figure 3** and throughout the present disclosure. Voltages and/or resistors can be adjusted for the use of MOSFETs, instead of bipolar transistors, to properly accommodate such substitution. In one embodiment, the enable circuit (320, 321, 322, 323, 324, 325, 345, 319) connects the output of buck converter (301) to its load (e.g., MOSFET switches, see description below for **Figure 4**) only when the 3.3V output is stable and above a 2.6V threshold, for example.

[0027] Transistor (316) and control circuit (318) are both internal to control block (315), the control circuit (318) being naturally defined by default in the “open drain” state when turned on. When the above-described two conditions are met, transistor (321) enables MOSFET (345) to turn on the drive voltage to power the V_i for the drive stage output (331). That is, in other words, drive stage output (331) may not actually receive a drive voltage when the control circuit is not operating. The control circuit may disable the drive voltage during other conditions, such as a low output voltage from buck converter (301) sensed by resistors (340) and (341) and connected to control circuit (318). Buck converter (301) may yield a wide range of voltage for the input voltage (333). Buck converter (301) also is controlled by control (304) and feedback from transistor (303). Resistors (342) and (343) connect the input voltage (333) to transistor (302), and the node in between the middle of resistors (342) and (343) may be directly connected to the control circuit (318) of control block (315). Low logic voltage may shut-down the voltage for the drive stage output (331). A wide operation range may be easily achieved by buck converter (301). The buck converter (301) may also be turned on when the input voltage (333) is above 6.5V, for example (at turn on, buck converter (301) is not required to regulate anything, and may just have an output voltage that is

higher than 5V, for example).

[0028] In one embodiment, transistor (316), transistor (320), transistor (321), diode (322), resistor (323), resistor (324), resistor (325), resistor (319) and transistor (345) are configured to ensure that transistor (345) is turned on only when voltage supply (330) is high enough and when control circuit (318) is working properly (e.g., ready and/or sending the proper signals). Transistor (321) will turn on when (I) voltage supply (330) is at an adequate level and (II) when control circuit (318) is working properly (e.g., ready and/or sending proper signals). First, transistor (321) may turn on only when voltage supply (330) is on and higher than, for example, 2.6V. At this voltage level the threshold formed by diode (322) and resistors (324) and (325), as well as the VBE (base-emitter) voltage of transistor (321) activates transistor (321), if transistor (320) is not turned on. Second, if control circuit (318) is operative or working properly, it will provide a high voltage to the base or gate of transistor (316) to turn on transistor (316). Transistor (316) may be the internal part of control circuit (318) with an open collector or open drain. When transistor (316) is on, transistor (320) is off, which prevents transistor (321) from being turned off if the voltage supply (330) is high enough (e.g., above 2.6V). When transistor (316) is turned off because control circuit (318) is not working properly for lack of power or simply not ready, and when logic supply (330) is high enough, resistor (323) is able to turn transistor (320) on. Once transistor (320) is on, the gate or base of transistor (321) is connected to the ground via transistor (320); and thus transistor (321) turns off, which in turn turns off transistor (345).

[0029] When the above described two conditions (I and II) are both met, transistor (321) is turned on to allow transistor (345) to turn on the drive voltage to drive the “Vi to drive stage” output (331). When transistor (321) turns off, the resistor (319) is not sufficient to turn on transistor (345) and thus the “Vi to drive stage” output (331) is disabled by the transistor (345).

[0030] In one embodiment, when (a) voltage supply (330) becomes high enough, at for example above 2.6V and (b) control (318) is not working properly to turn on transistor (316), the voltage level after dropping past resistor (323) is high enough to feed into the base or gate of transistor (320), which then is able to turn transistor (320) on or put it in saturation mode. Transistor (320) may be turned on only if transistor

(316) is off, which indicates that the control circuit (318) is not ready. In such a case where the transistor (320) is turned on in saturation mode, the base or gate of transistor (320) is connected to ground via the transistor (316) in saturation mode. When transistor (320) is on, a voltage near a ground value is sent to the gate or base of transistor (321) via transistor (320), therefore turning transistor (321) and transistor (345) off (since the control circuit (318) is not be ready, as indicated by the state of transistor (316)). In one embodiment, transistor (316) serves as a switch to toggle transistor (320). If transistor (316) is turned off, as discussed above, transistor (320) may be on if the voltage supply (330) is high enough. Likewise, if transistor (316) is turned on, a ground value is fed into the base or gate of transistor (320), therefore turning transistor (320) off. In one embodiment, transistor (316) is controlled by control circuit (318) to indicate the readiness of the control circuit (318). When ready, control circuit (318) provides a high enough voltage to the base or gate of transistor (316) to turn it on.

[0031] When transistor (321) is on, transistor (345) is on if the output (332) from the converter (301) is high enough. Likewise, if transistor (321) is off, transistor (345) is off even if the output (332) is high enough (for the lack of a sufficient voltage drop across bias resistor (319)). In one embodiment, transistor (345) is always off until the voltage drop across resistor (319) increases to turn transistor (345) on (e.g., when output (332) is high enough and transistor (321) is on for a connection to ground). In one embodiment, the transistor (345) is a PMOS transistor or a PNP bipolar junction type of transistor. In one embodiment, a sufficient voltage drop across resistor (319) from logic supply (332) is provided by transistor (321) turning on and therefore connecting the gate of transistor (345) to ground.

[0032] In one embodiment, the input voltage of buck converter (301) is between the input voltage (333) and the ground located at the bottom of the diode (305) and the capacitor (307). The output voltage of buck converter (301) is between the voltage (332) and the same ground located at the bottom of the diode (305) and the capacitor (307). Changing the duty cycle of MOSFET (302) changes the output voltage of buck converter (301). Control circuit (304) of buck converter (301) controls the duty cycle of buck converter (301) by controlling the gate of MOSFET (302). The input voltage of

buck converter (311) is between the voltage on the node just above the capacitor (326) and the ground located at the bottom of the diode (325) and the capacitor (328). The output voltage of buck converter (311) is between the voltage on (330) and the same ground located at the bottom of diode (325) and the capacitor (328). Like buck converter (303), the control circuit (314) of buck converter (311) controls the duty cycle of buck converter (311) by controlling the gate of MOSFET (312).

[0033] The buck converter (311) is operative from 5V to 20V, for example. Thus, if input loss conditions are experienced, buck converter (311) is the last unit to turn off running from bypass capacitor (326) while buck converter (301) cannot regulate the circuit/system or is in off mode. The buck converter (311) also runs off control circuit (314), the control circuit (314) working in tandem with transistor (314) to effectively control buck converter in a feedback mechanism. Furthermore, in one embodiment, the auxiliary circuit (300) is to identify low power conditions and reduce buck converter (301) voltage from 11V to 7V, for example, by transistor (317), which may in turned be controlled by transistor (303), transistor (303) being able to control the buck converter (301) set point or ideal operating point by means of control circuit (304). When the control circuit identifies low power conditions, it may set transistor (317) on, which results in transistor (303) going off and voltage (332) being set to a low operation drive voltage (typically 7V, for example, which is the lowest power consuming mode voltage of the overall control circuit). MOSFET (303) also effectively serves as a switch to selectively lower the voltage output of buck converter (303) from 11V to 7V, for example. For most low voltage MOSFETS, two levels of drive voltage may be enough, but additional levels are possible.

[0034] One of the problematic aspects of operating a controller in a solar power environment is the unreliability of the power source during the early morning hours as well as during late evening hours, when faint blue light allows the panel to generate a high voltage, but presents barely enough current to properly operate. As a result, circuits often create a "false start" in which the voltages appear to be there, but as soon as the controller becomes active there is a drop or brown out or power outage, leading to the undesirable occurrence of unstable or even meta-stable modes, which may occur more frequently for small processors.

[0035] **Figure 4** shows a schematic description of a circuit practicing a system and method according to an embodiment of the present disclosure. Circuit (400) is another circuit that may be used as an auxiliary power supply or power supply module for a photovoltaic system, for example. In one embodiment, circuit (400) uses control logic to ensure that solar power is strong enough to enable output from the buck converter (402). Preload resistor P1 (405) is used to emulate the load of buck converter (402). If the output of buck converter (401) can support the load, the preload resistor P1 (405) is disconnected and the output of the buck converter (402) is connected to its load. Circuit (400) therefore can be used to address the false start problem that occurs when the solar panel is able to provide enough output voltage when it is not connected to the output, but not enough to sustain even a small current provided by the buck converter (402) to its load, such as a control logic, a control circuit, a micro-controller, etc.

[0036] In one embodiment, when the intermediate housekeeping voltage V_{buck1} (i.e., the voltage to operate an auxiliary microcontroller unit or MCU) is turned on by buck converter (401), V_{buck1} is initially used to power a preload resistor P1 (405), by turning on the switch (404), typically a FET or bipolar transistor controlled by one of the outputs of delay circuit (403) (also supplied by V_{buck1} but not shown here for clarity). The other output of delay circuit (403) suppresses at the same time buck converter (402). After the housekeeping voltage V_{buck1} is above a predefined threshold for the full delay period of delay circuit (403), the switch 404, and thus the preload resistor P1, is turned off to provide power for the load of the buck converter (402) and the 3.3V logic is permitted to turn on and output from buck converter (402) in accordance with the enable signal from the delay (403).

[0037] Here, in **Figure 4**, V_{buck1} is shown having an ideal range of 10-11V, for example, but this range has been merely provided for exemplary purposes and should not be taken to limit the disclosure to any particular range. This approach provides a smooth turn-on of the logic voltage. Typically, the load of resistor P1 (405) should exceed the load of buck converter (402) (buck converter's load being the MCU which is not shown), so that activating buck converter (402) does not crash the housekeeping voltage V_{buck1} . Otherwise, the system of the circuit (400) might experience turn-on attempts which could not be completed, and as a result, the MCU could get stuck due to

meta-stability effects of the MCU in some cases and some of the time.

[0038] In one embodiment, the loading of this approach is slightly unpredictable; and positive hysteresis is introduced in order to prevent oscillations. For instance, amplifier (406) may be used as a VHV (very high voltage) monitor in order to perform positive hysteresis to ultimately avoid oscillations. The reason this hysteresis modification is used is that at very low light conditions (where the sunlight is very dim for instance), solar panels can provide voltages that are high enough for turning on, but cannot ultimately provide sufficient power for the circuit that is to be powered by the buck converter (402). Therefore, identifying a simple threshold for voltage V_{buck1} does not stop unsuccessful turn-on attempts, if no hysteresis is employed in delay circuit (403) (meaning the delay starts only if V_{buck1} is, for example, at least 1.2 times the minimal input voltage of buck converter (402)). One way to prevent such attempts is to permit the system of circuit (400) to turn on only when it can stay on with the available given power. Power is measured by measuring the voltage on resistor P1 (405) (plus any losses from the switch (404)) as represented by V_{buck1} . In one embodiment, the delay circuit (403) can be omitted from the circuit (400), since this approach can also work with zero delay because of positive hysteresis. The above-described approach improves the performance of an electronic device mounted on a panel and a device having a MCU or a device similar to a MCU. The buck converter (401) part should be able to accept any variation in voltage during turn-on because it may not be sensitive.

[0039] In the above **Figures 3 – 4**, the voltage conversion section of the buck converters (e.g. 401, 402, 301, or 311) can be replaced with step-down converters or other converters known in the art.

[0040] In one embodiment, the features illustrated in **Figure 3** can also be used in the circuit in **Figure 4**. For example, the enable circuit (320, 321, 322, 323, 324, 325, 345, and 319) in **Figure 3** can be used in the circuit of **Figure 4** to control the output of the voltage V_{buck1} to a drive stage via MOSFET (345). For example, a capacitor can be connected to the input of the buck converter 402 in **Figure 4**, in a way as the capacitor 326 connected to the input of the buck converter 311 in **Figure 3**. For example, the control block 318 used to control the enable circuit in **Figure 3** can also be used in the circuit of **Figure 4**; and the circuit (317, 303, 308-310) and control block

(304) in **Figure 3**, used to reduce output voltage of the buck converter 301 when the input power from the solar panel is low, can also be used to control the output voltage of the buck converter (401) in **Figure 4**. For examples, the resistors 340-343 connected to input and output of the buck converter 301 in **Figure 3** to detect low power conditions in **Figure 3** can also be used for the buck converter 401 in **Figure 4**.

[0041] One application of the present disclosure is using the high voltages from buck converter (e.g. 301 or 401) (e.g. V_{buck1}) to control MOSFET switches used in a solar panel energy system and the low voltage from buck converter (e.g. 311 or 402) can be used to power control circuits for a solar panel using the power generated by the solar panel. Examples of the MOSFET switches can be found in at least U.S. Pat. App. Ser. No. 12/366,597, published as U.S. Pat. App. Pub. No. 2009/0133736, and U.S. Pat. App. Ser. No. 12/411,317, now issued as U.S. Pat. No. 7,602,080, all the contents of which are incorporated herein by reference. Examples of the control circuits can be found in at least U.S. Pat. App. Ser. No. 11/875,799, published now as U.S. Pat. App. Pub. No. 2008/0097655, and U.S. Pat. App. Ser. No. 12/411,317, now issued as U.S. Pat. No. 7,602,080, the contents of which are incorporated herein by reference.

[0042] **Figure 5** shows a schematic description of an example startup behavior of wave forms, according to an embodiment of the present disclosure. Wave forms (500), where the x-axis is time, may be generated from running the circuit (400) shown in **Figure 4**, above, through simulations. Curve (501) may represent the V_{in} (or input voltage value) from the solar panel into buck converter (401). Curve (502) may represent the output of buck converter (401), which is V_{buck1} as shown in **Figure 4**. Curve (503) may represent the power used from the panel. Note in **Figure 5** the drop of power at dotted line (505) when the photovoltaic system is turned on. At dotted line (505), the second stage is turned on and therefore the system is turned on. Curve (504) may represent the output of delay circuit (403) controlling switch (404) and curve (506) may represent the V_{B2E} value coming out of delay circuit (403) ultimately used to control buck converter (402). Also, Curve (504) may show that the preload resistor P1 (405) may be turned off after V_{buck1} passes a designated threshold level and a delay time has passed.

[0043] It is clear that many modifications and variations of this embodiment may be

made by one skilled in the art without departing from the spirit of the novel art of this disclosure. These modifications and variations do not depart from the broader spirit and scope of the present disclosure, and the examples cited here are to be regarded in an illustrative rather than a restrictive sense.

[0044] The performance of solar modules can vary significantly with temperature. A system capable of measuring temperature can implement methods for controlling the voltage, power output, or the efficiency of one or more strings of solar module controllers using module temperature as a factor. For example, a formula presented by Nalin K. Gautam and N.D. Kaushika in “An efficient algorithm to simulate the electrical performance of solar photovoltaic arrays,” *Energy*, Volume 27, Issue 4, April 2002, pages 347-261, can be used to compute the voltage of a solar module at the maximum power point. Other formulae can also be used.

[0045] Many variations can be applied to the above disclosed systems and methods, without departing from the spirit of the present disclosure. For example, additional components can be added, or components can be replaced. For example, rather than using a capacitor as primary energy storage, an inductor can be used, or a combination of inductor and capacitor. Different types of transistors – such as MOSFET or bipolar transistors – may also be used interchangeably, with appropriate adjustments to voltage and other settings. Also, the balance between hardware and firmware in the micro controllers or processors can be changed, without departing from the spirit of the present disclosure.

[0046] It is clear that many modifications and variations of this embodiment can be made by one skilled in the art without departing from the spirit of the novel art of this disclosure. For example, the systems and method herein disclosed can be applied to energy generating systems besides solar photovoltaics (e.g., windmills, water turbines, hydrogen fuel cells, to name a few). Also, although specific voltage values and thresholds have been mentioned, other reference points for the target voltage can also be used. These modifications and variations do not depart from the broader spirit and scope of the present disclosure, and the examples cited here are to be regarded in an illustrative rather than a restrictive sense.

[0047] In the foregoing specification, the disclosure has been described with

reference to specific exemplary embodiments thereof. It will be evident that various modifications can be made thereto without departing from the broader spirit and scope as set forth in the following claims. The specification and drawings are, accordingly, to be regarded in an illustrative sense rather than a restrictive sense.

CLAIMS

What is claimed is:

1. An apparatus, comprising:
a micro-controller;
a first stage power converter to generate a first output from a direct current input;
a control circuit powered by the first output; and
a second stage power converter connected to the first stage power converter and
configured to convert the first output to a second output;
wherein the control circuit is configured to block the second stage power
converter from powering the micro-controller using the second output in a
time period that is after the control circuit is powered by the first output
and before a predefined condition is met in the control circuit.
2. The apparatus of claim 1, further comprising:
a power absorption circuit powered by the first output during the time period;
wherein the predefined condition includes a voltage of the first output reaching a
threshold; and
wherein after the time period, the control circuit stops the power absorption circuit
from consuming the first output from the first stage power converter.
3. The apparatus of claim 2, wherein the power absorption circuit comprises a
capacitor coupled to the first output; and when the voltage is above the threshold,
the capacitor has sufficient energy to power the second stage power converter to
operate the micro-controller for at least a predetermined period of time, in
absence of power input from the first stage power converter during the
predetermined period of time.
4. The apparatus of claim 2, wherein the power absorption circuit comprises a
switchable load.

5. The apparatus of claim 4, wherein the control circuit signals the switchable load to be in a first state of consuming the first output during the time period and to be in a second state of not consuming the first output after the time period.
6. The apparatus of claim 5, wherein, when the switchable load is in the second state, the voltage above the threshold is sufficient to power the second stage power converter to operate the micro-controller for at least a predetermined period of time during which the direct current input to the first stage power converter has diminishing power.
7. The apparatus of claim 5, wherein the switchable load comprises:
a resistive device; and
a switching device connected to the resistive device, wherein the switching device is turned on in the first state to connect the resistive device to the first output and turned off in the second state to disconnect the resistive device from the first output.
8. The apparatus of claim 5, wherein the control circuit delays a first signal instructing the switching device to change from the first state to the second state to generate a second delayed signal that instructs the second stage power converter to change from not powering the micro-controller to powering the micro-controller.
9. The apparatus of claim 8, wherein the control circuit comprises:
a hysteresis amplifier coupled to the first output to generate the first signal; and
a delay circuit coupled to the first signal to generate the second delayed signal.
10. A method to supply power, the method comprising:
generating, by a first stage power converter, a first output from a direct current input;
powering a control circuit using the first output;
generating, by a second stage power converter connected to the first stage power converter, a second output from the first output from the first stage

- power converter;
- blocking, by the control circuit during a time period that is after the control circuit is powered by the first output and before a predefined condition is met in the control circuit, the second output from the second stage power converter from powering a micro-controller; and
- powering the micro-controller using the second output from the second stage power converter after the time period.
11. The method of claim 10, further comprising:
consuming, by a power absorption circuit, at least a portion of the first output from the first stage power converter during the time period .
 12. The method of claim 11, wherein the predefined condition includes a voltage of the first output reaching a threshold; and the method further comprises:
stopping, by the control circuit after the time period, the power absorption circuit from consuming the first output from the first stage power converter.
 13. The method of claim 11, wherein the consuming includes:
consuming, by a switchable load in the power absorption circuit, the portion of the first output from the first stage power converter during the time period.
 14. The method of claim 13, further comprising:
signaling, by the control circuit, the switchable load to be in a first state of consuming the portion of the first output during the time period; and
signaling, by the control circuit, the switchable load to be in a a second state of not consuming the first output from the first stage power converter after the time period.
 15. The method of claim 14, wherein, when the switchable load is in the second state, the voltage above the threshold is sufficient to power the second stage power converter to operate the micro-controller for at least a predetermined period of time during which the direct current input to the first stage power converter has diminishing power.

16. The method of claim 14, wherein the switchable load includes a resistive device, and a switching device connected to the resistive device; wherein the method further includes:
turning on the switching device to place the switchable load in the first state in which the resistive device is connected to the first output; and
turned off the switching device to place the switchable load in the second state in which the resistive device is disconnected from the first output.
17. The method of claim 14, further comprising:
delaying, by the control circuit, a first signal instructing the switching device to change from the first state to the second state; and
generating, via the delaying, a second delayed signal that instructs the second stage power converter to change from not powering the micro-controller to powering the micro-controller.
18. The method of claim 17, further comprising:
generating the first signal using a hysteresis amplifier coupled to the first output.
19. A power supply in a solar electric production system, the power supply comprising:
a micro-controller;
a first stage power converter having:
an input connected to a first voltage from a photovoltaic panel; and
an output providing a second voltage different from the first voltage from the photovoltaic panel;
a control circuit powered by the output of the first stage power converter; and
a second stage power converter connected to the output of the first stage power converter and configured to supply power at a third voltage to the micro-controller;
wherein the control circuit is configured to block the second stage power converter from powering the micro-controller at the third voltage in a time period that is after the control circuit is powered by the output of the first

stage power converter and before a predefined condition is met in the power supply.

20. The power supply of claim 19, wherein the first stage power converter is a first step-down converter, and the second stage power converter is a second step-down converter.

ABSTRACT

A power supply for use in a solar electric production system, including: a first stage having an input connected to a voltage from a photovoltaic panel and an output providing a first voltage different from the voltage from the photovoltaic panel; and a second stage connected to the output of the first stage, the second stage supplying power at a second voltage to a micro-controller, where the output of the first stage is turned on and stable for a period of time before the second stage is turned on to supply the power at the second voltage to the micro-controller.

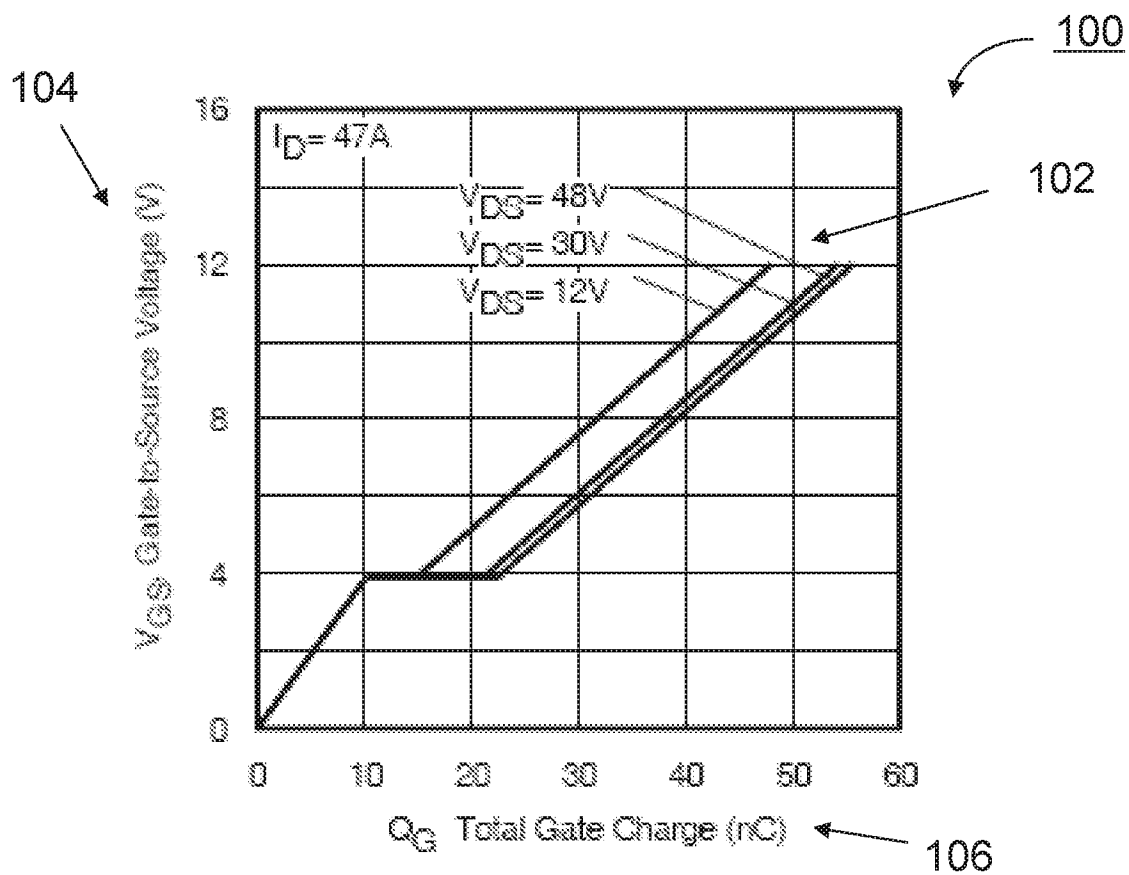


Figure 1

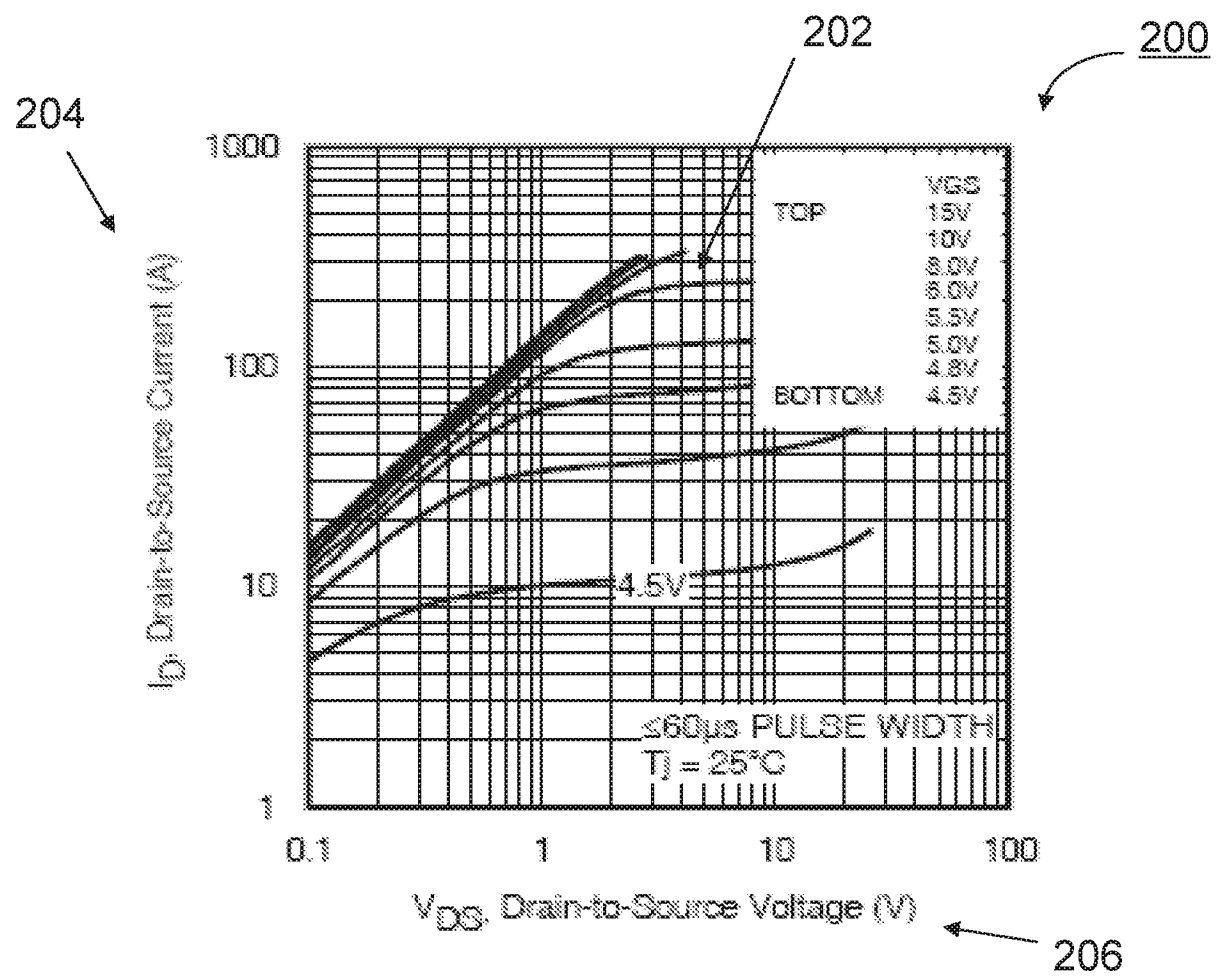


Figure 2

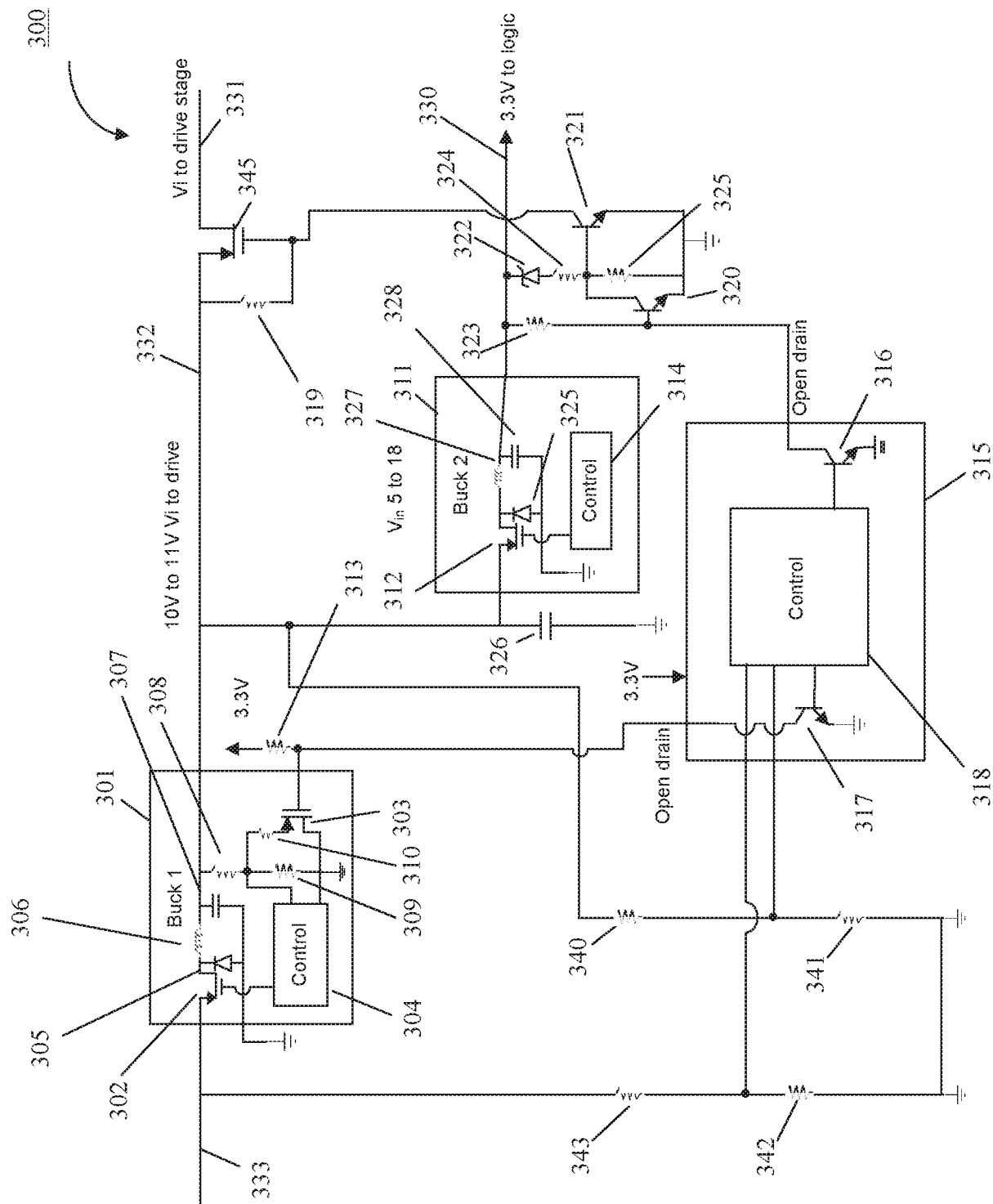


Figure 3

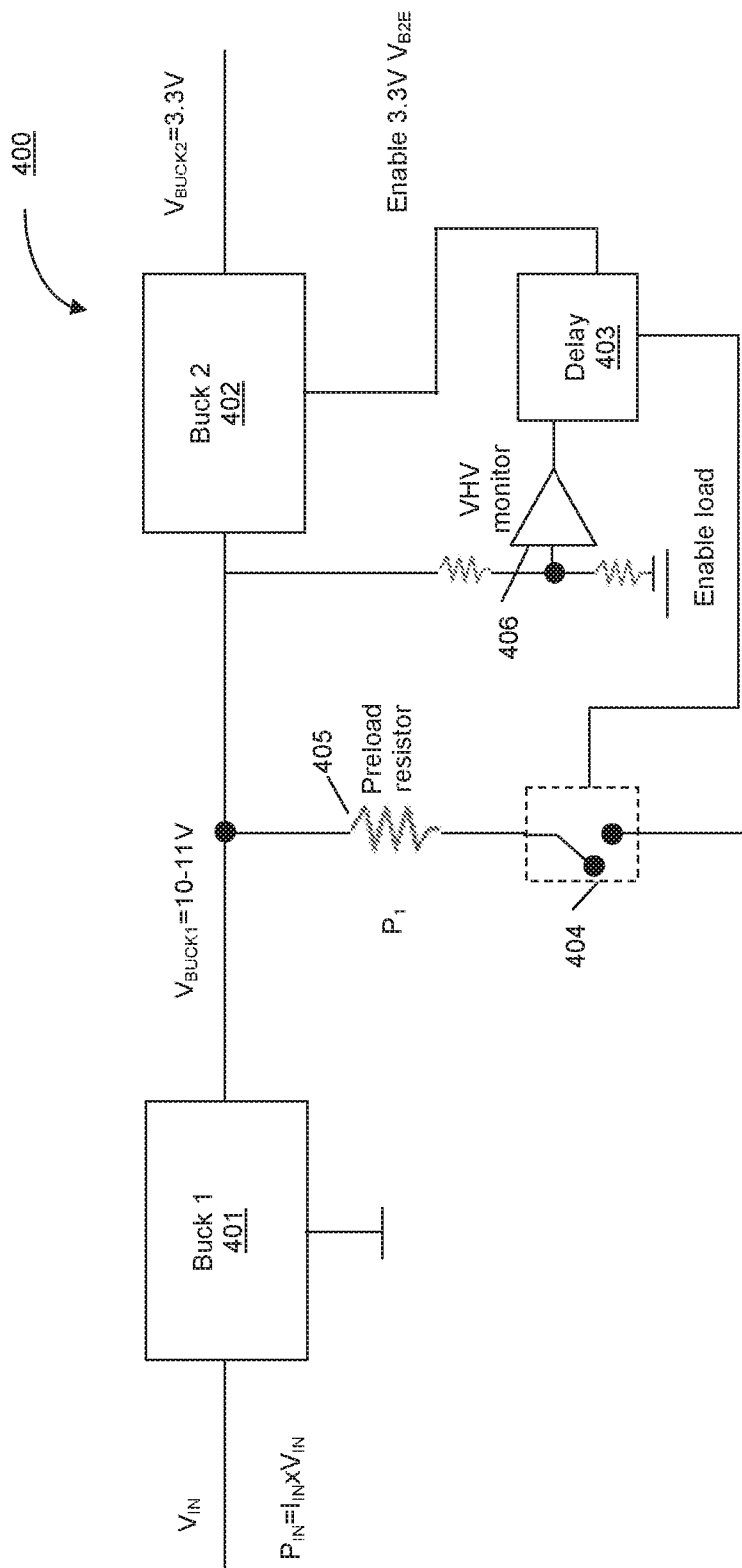


Figure 4

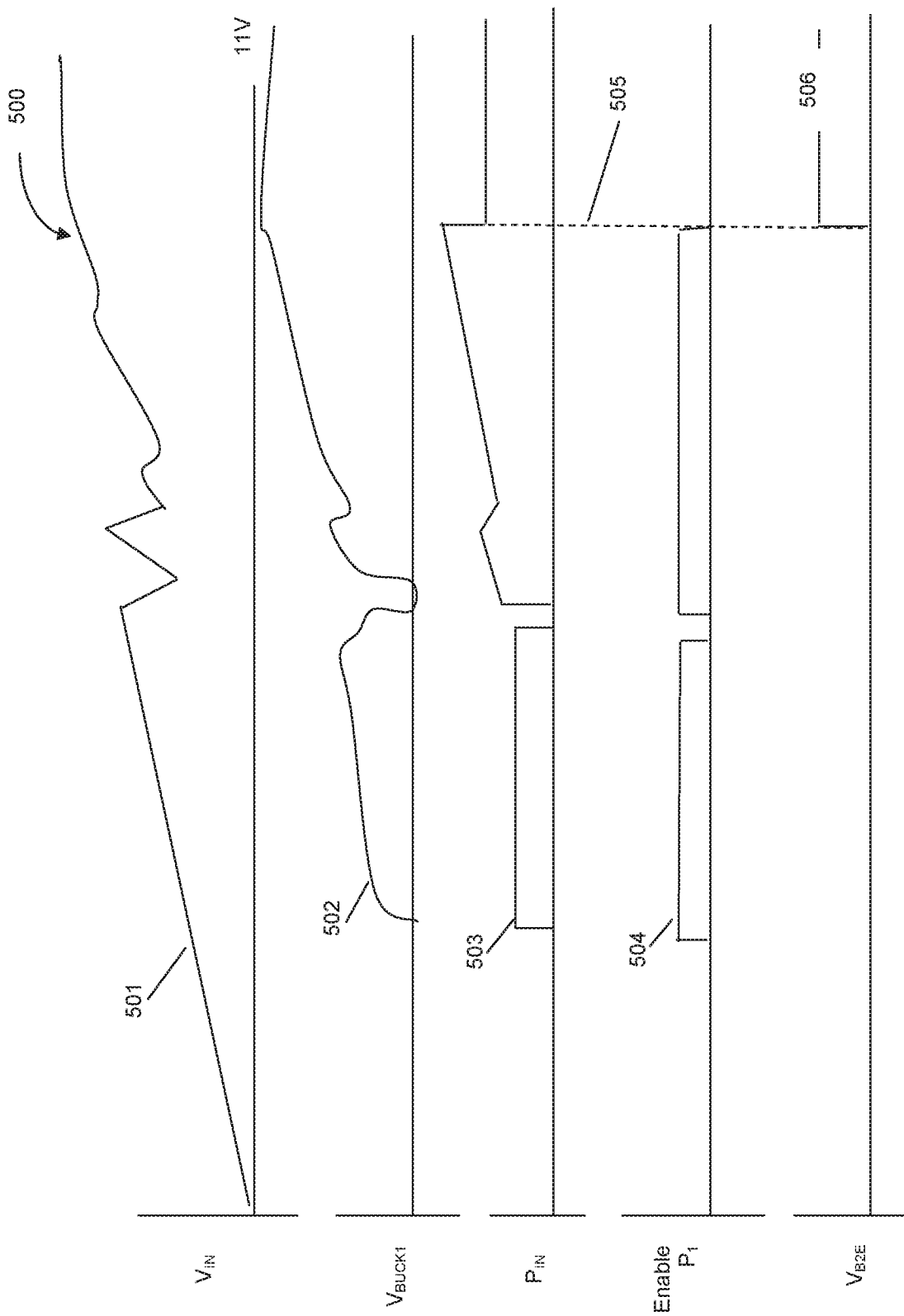


Figure 5

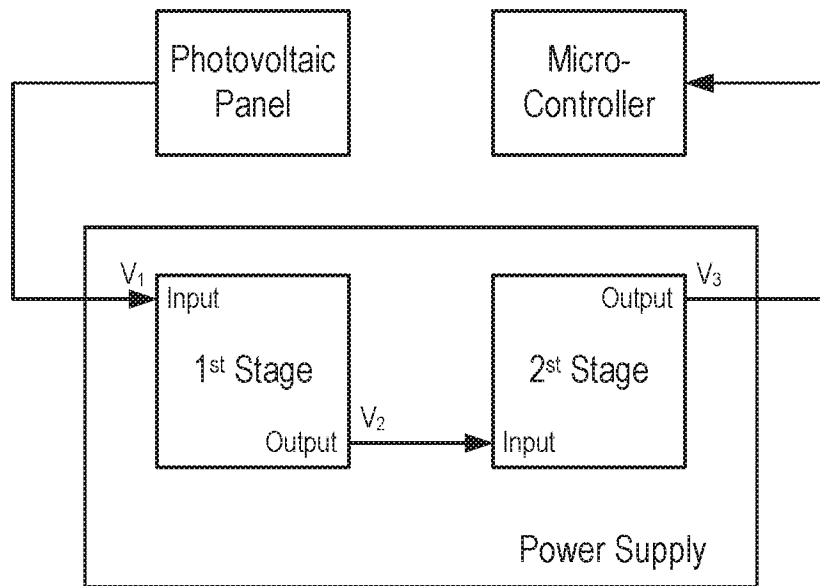


Figure 6