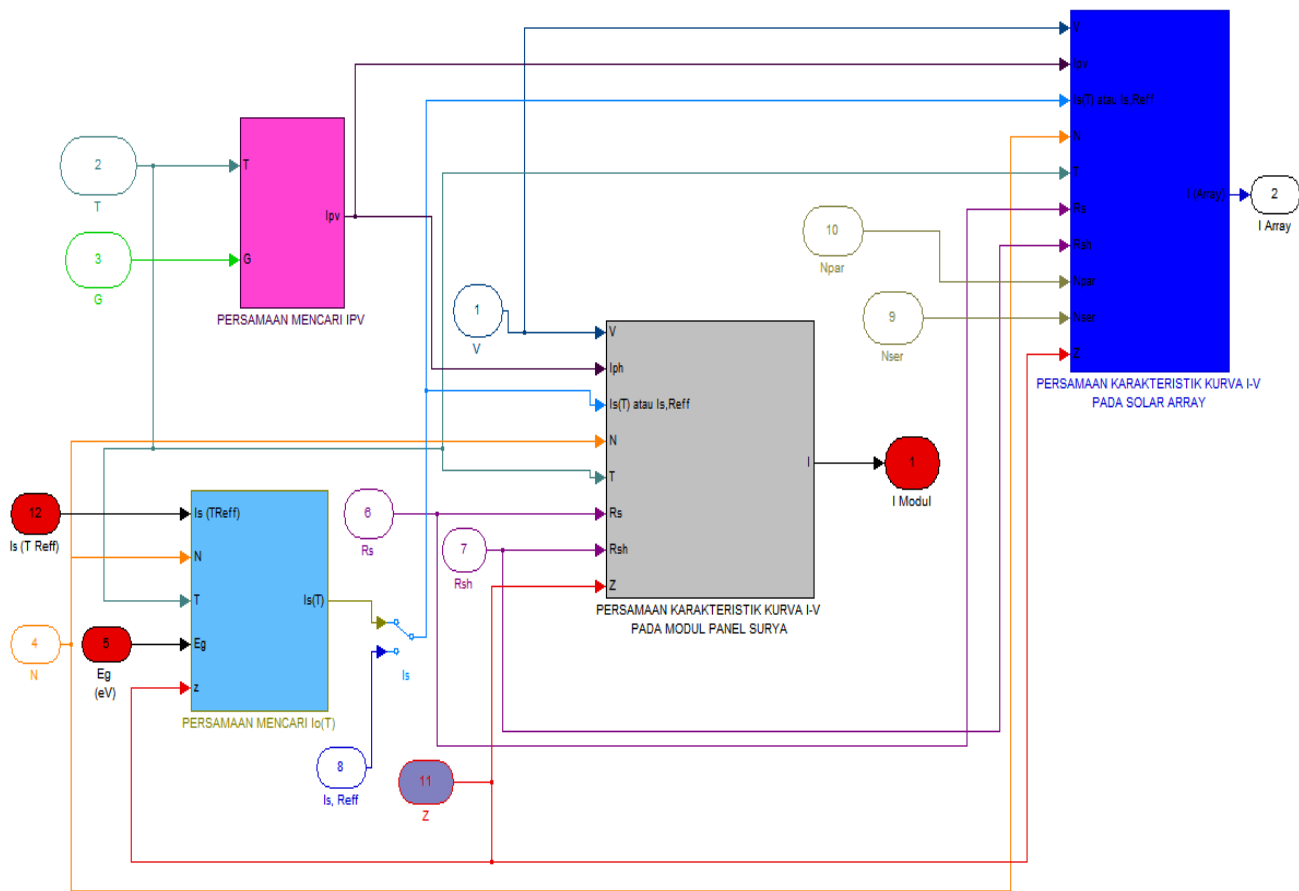


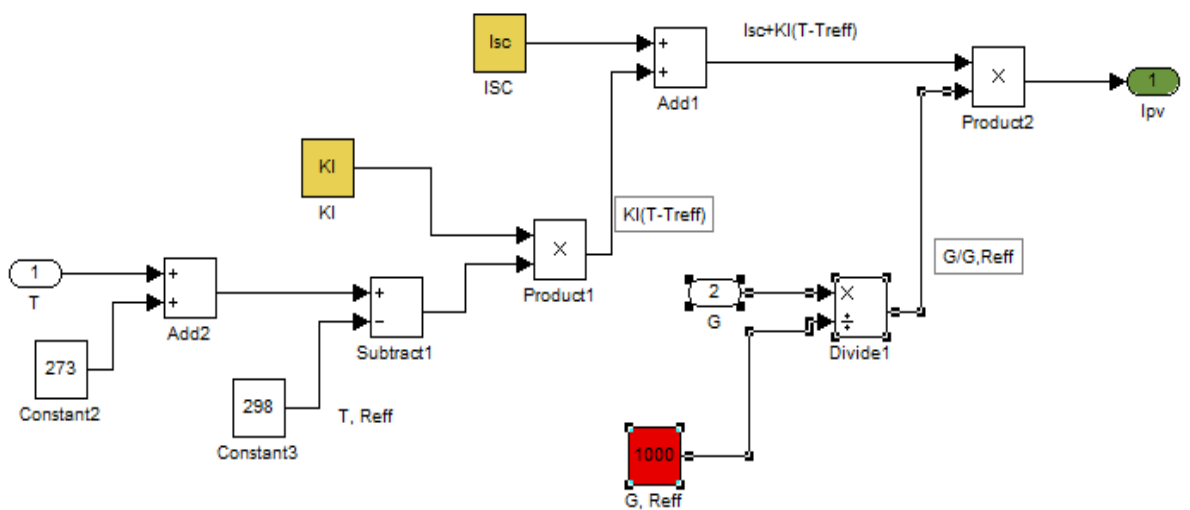
## LAMPIRAN A

PEMODELAN KOMPONEN-KOMPONEN PADA  
SISTEM PANEL SURYA KEDALAM SIMULINK™

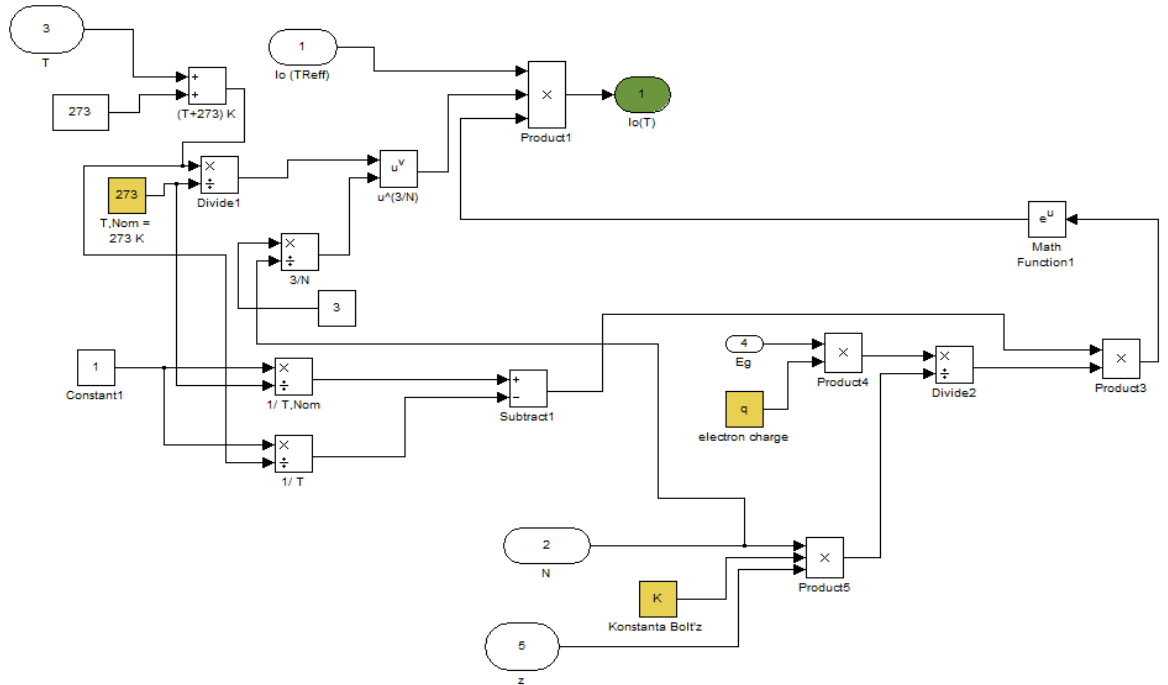
### A.1 Pemodelan Modul Panel Surya dan Solar Array.



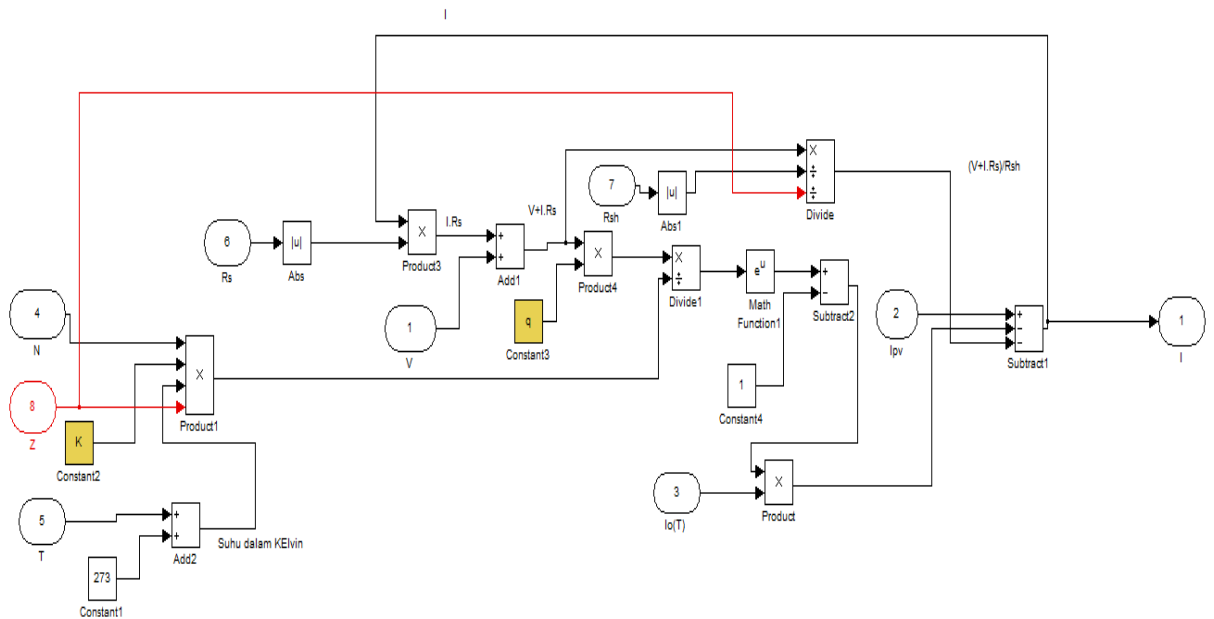
#### A.1.1 Pemodelan persamaan untuk mencari $I_{pv}$ (Persamaan 4.2 : Blok berwarna merah muda).



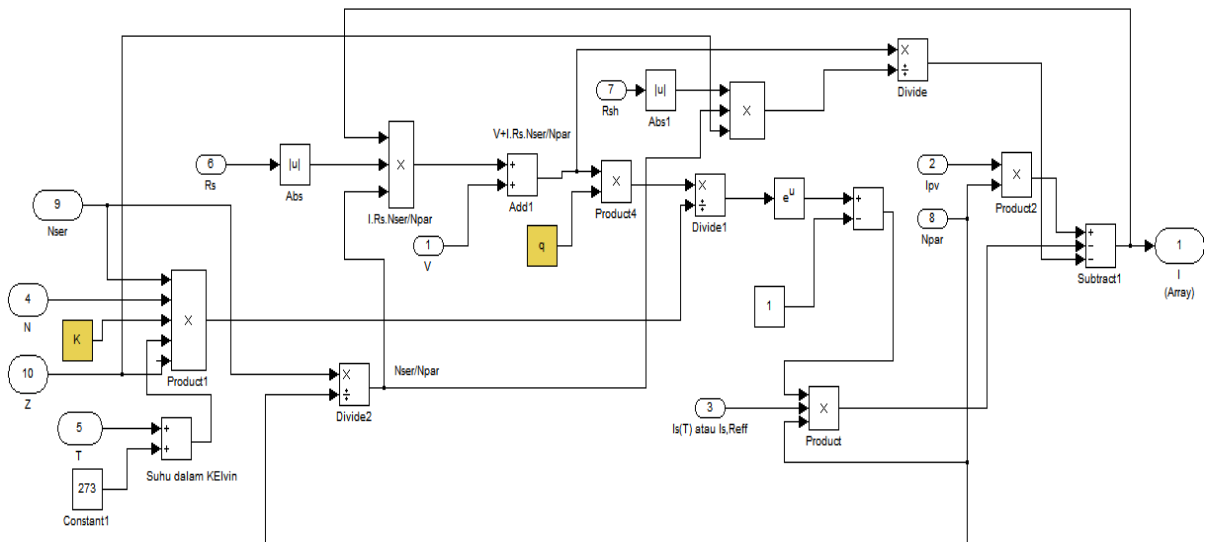
A.1.2 Pemodelan persamaan untuk mencari  $I_0(T)$  (Persamaan 4.1 : Blok berwarna biru muda)



A.1.3 Pemodelan persamaan untuk mencari karakteristik kurva I-V modul panel surya (Persamaan 4.3 : Blok berwarna abu-abu)

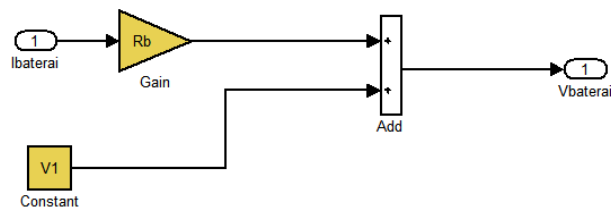


A.1.4 Pemodelan persamaan untuk mencari karakteristik kurva I-V *Solar Array*  
(Persamaan 2.15 : blok berwarna biru tua)

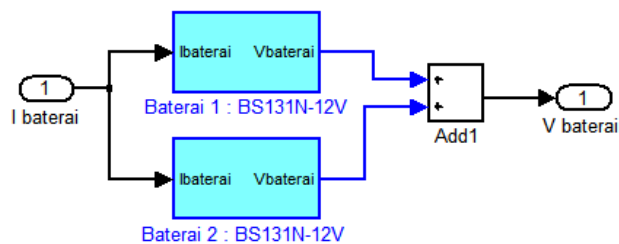


A.2 Pemodelan Baterai 12V dan 24V

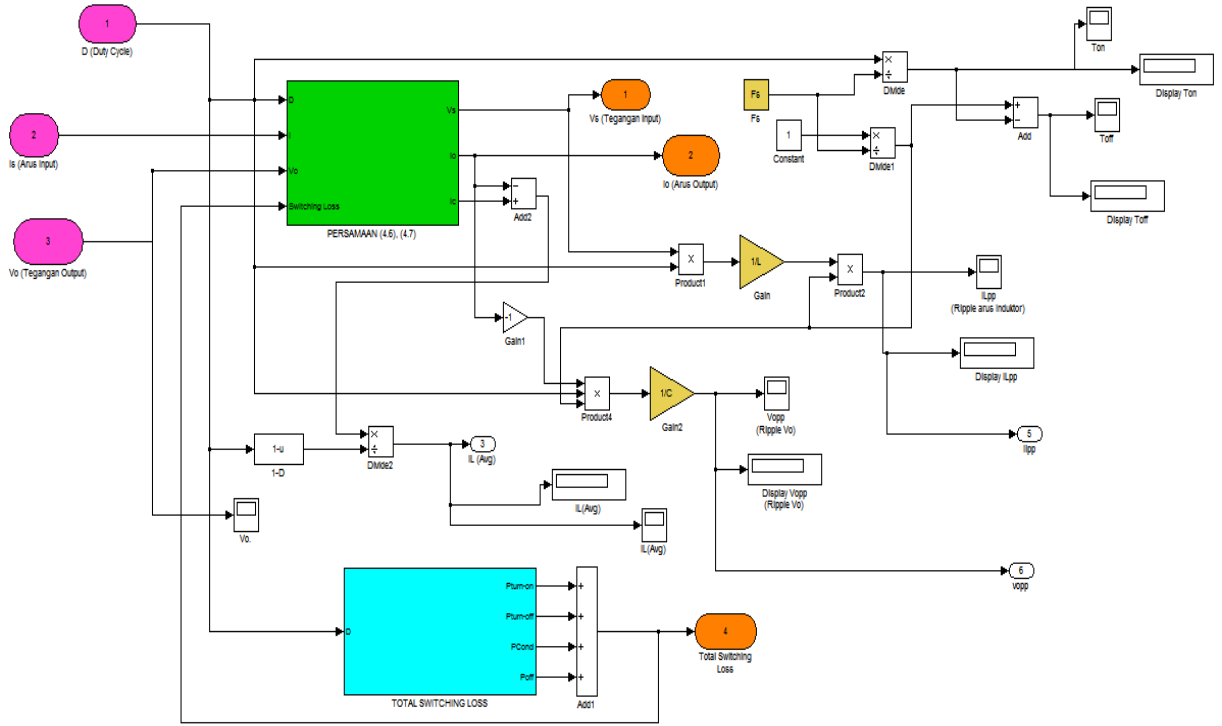
A.2.1 Pemodelan Baterai 12V



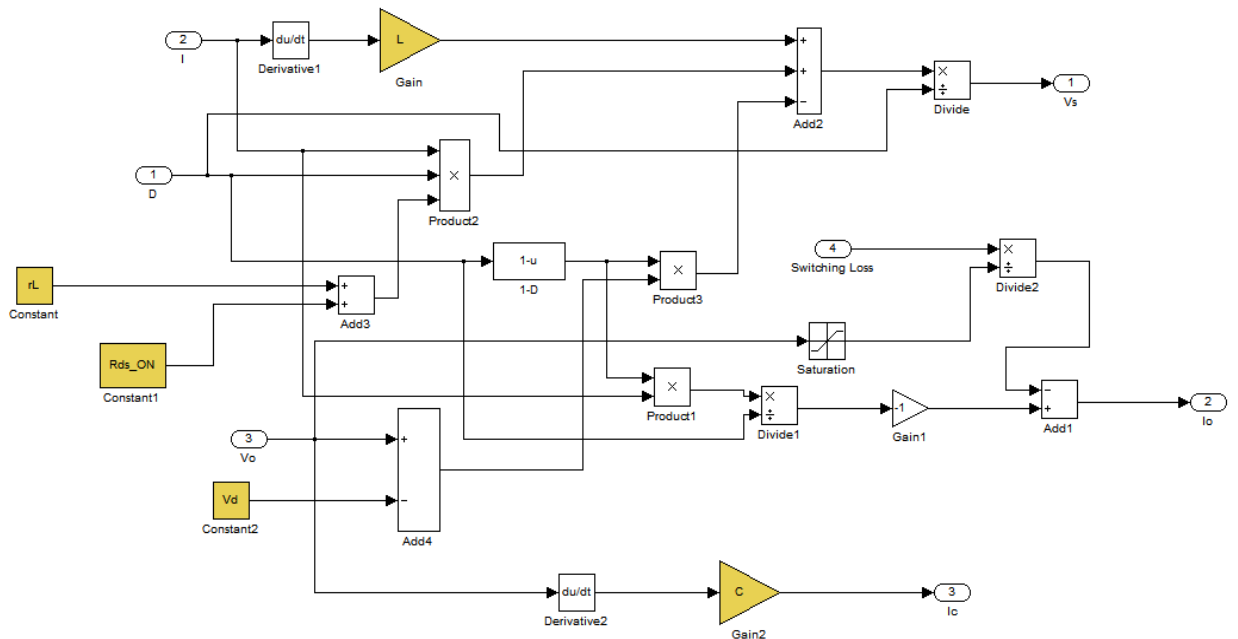
A.2.2 Pemodelan baterai 24V



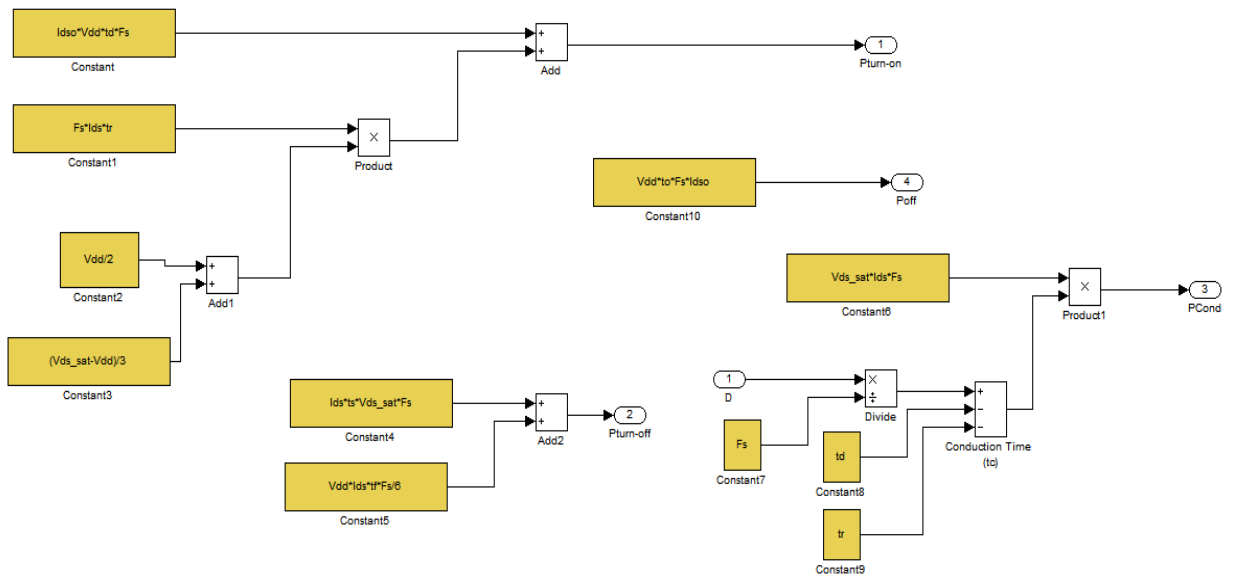
### A.3 Pemodelan Konverter DC-DC *Buck-Boost*



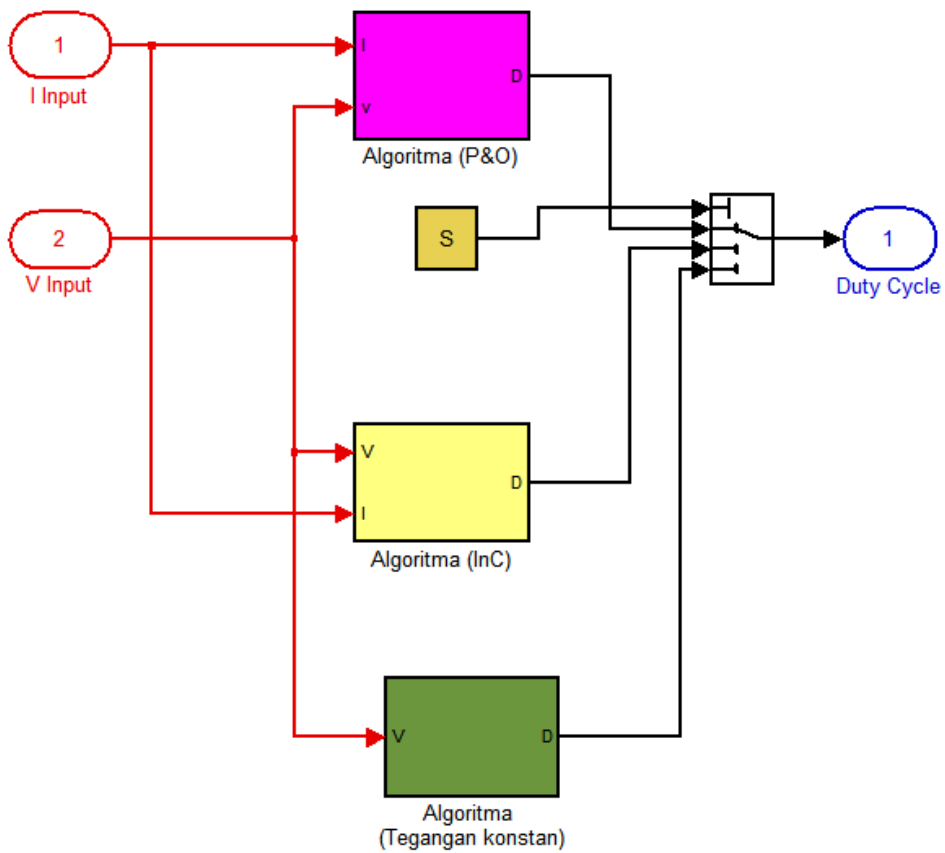
#### A.3.1 Pemodelan persamaan matematika (4.6), dan (4.7)



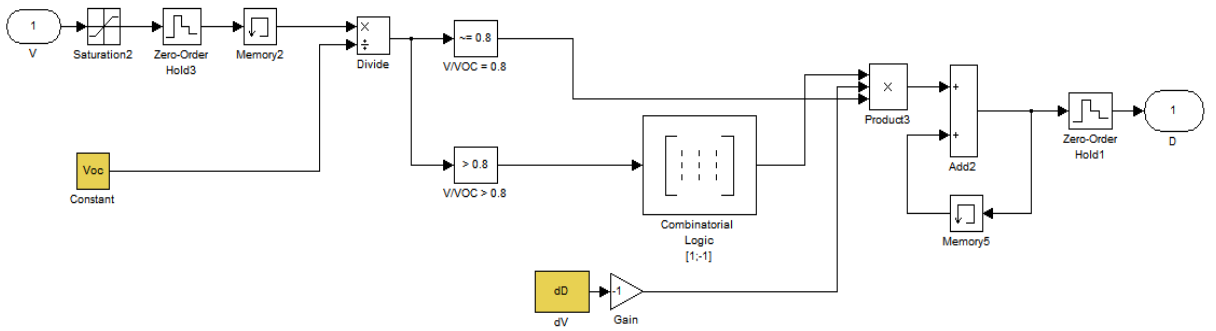
### A.3.2 Pemodelan MOSFET switching loss (4.5)



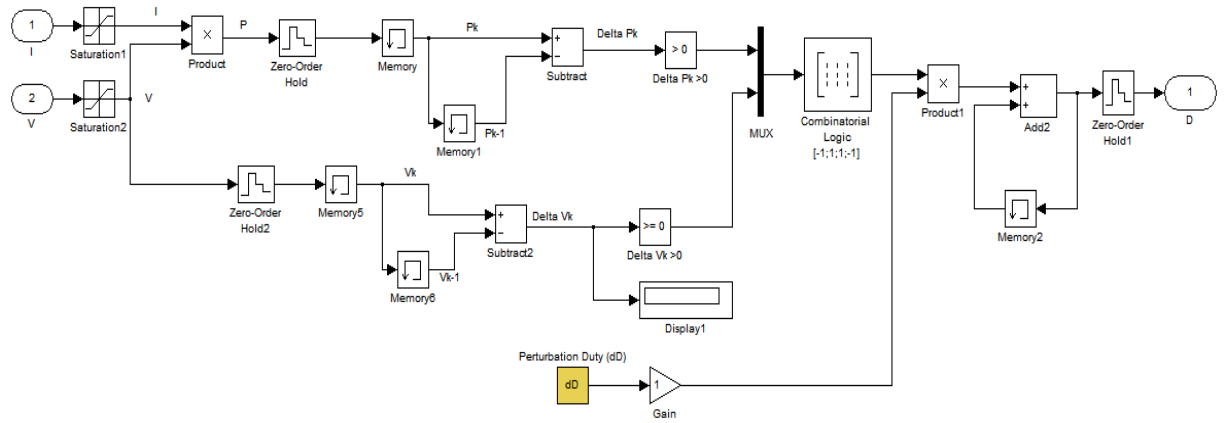
### A.4 Pemodelan Pengendali MPPT



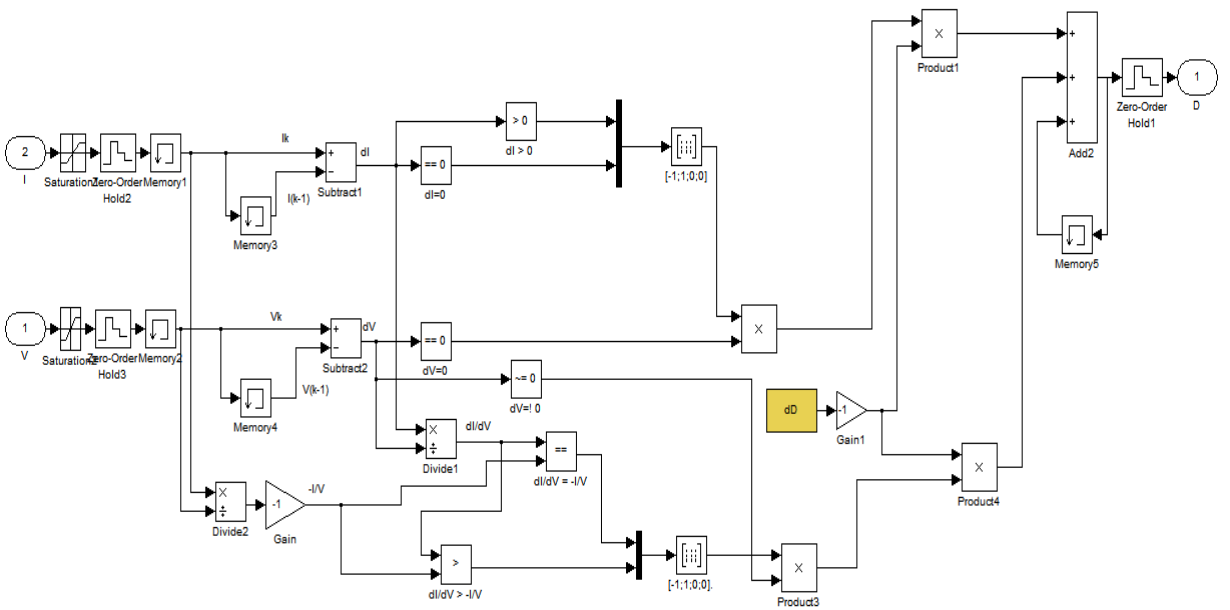
### A.4.1 Pemodelan Algoritma Tegangan Konstan



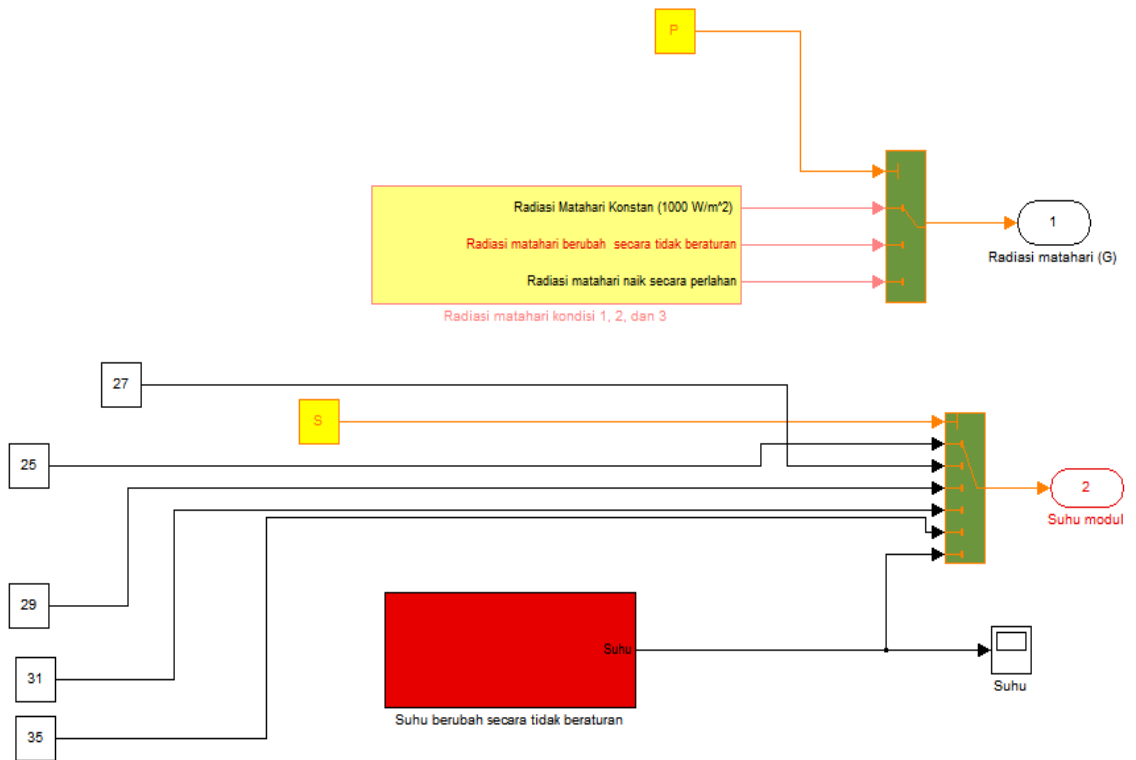
### A.4.2 Pemodelan Algoritma P&O



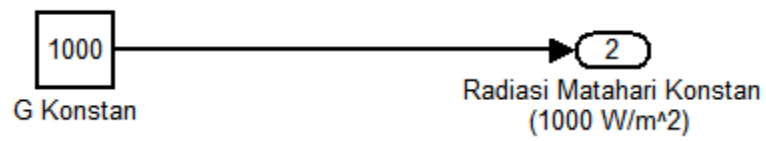
### A.4.2 Pemodelan Algoritma InC



## A.5 Pemodelan Radiasi Matahari dan Suhu Modul Surya

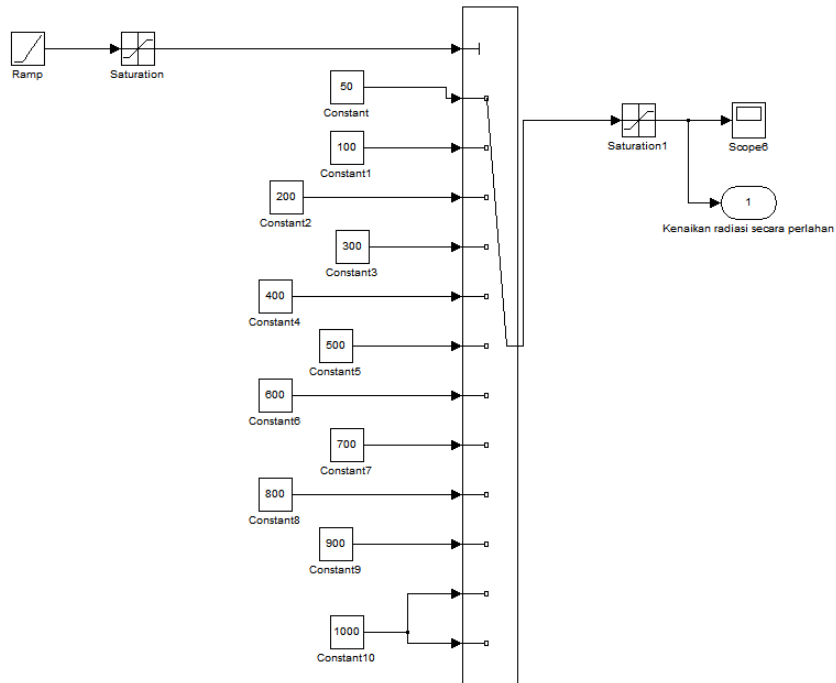


### A.5.1 Pemodelan Kondisi I (Radiasi Matahari Ideal)

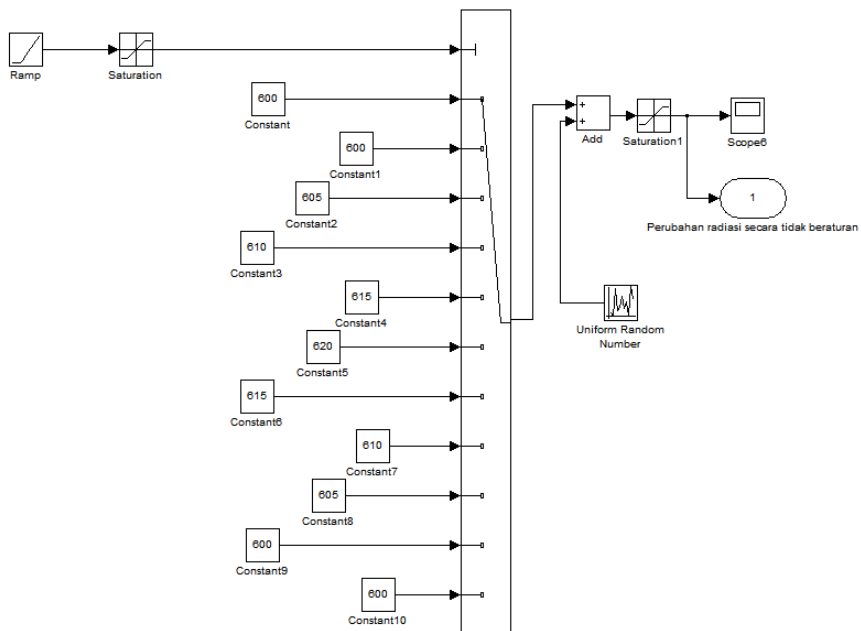




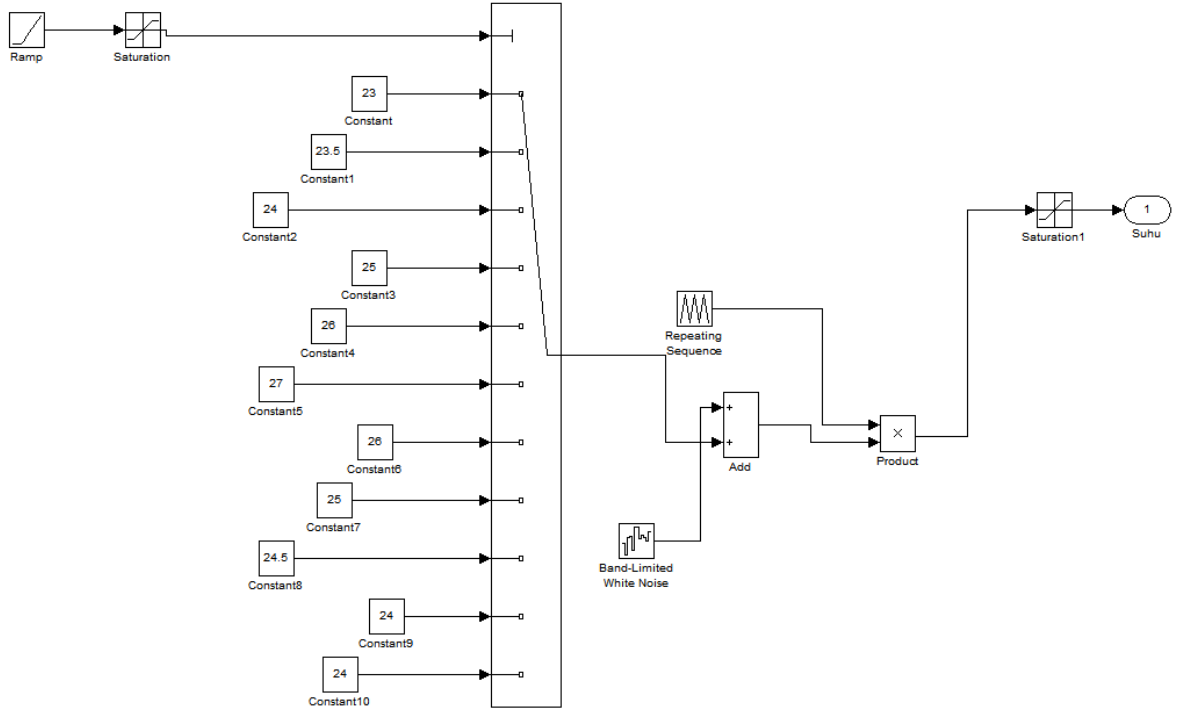
### A.5.2 Pemodelan Kondisi II (Kenaikan Radiasi Matahari Secara Perlahan)



### A.5.3 Pemodelan Kondisi III (Perubahan Radiasi Matahari Secara Tidak Beraturan)



### A.5.4 Pemodelan Kondisi III (Perubahan Suhu Modul Secara Tidak Beraturan)

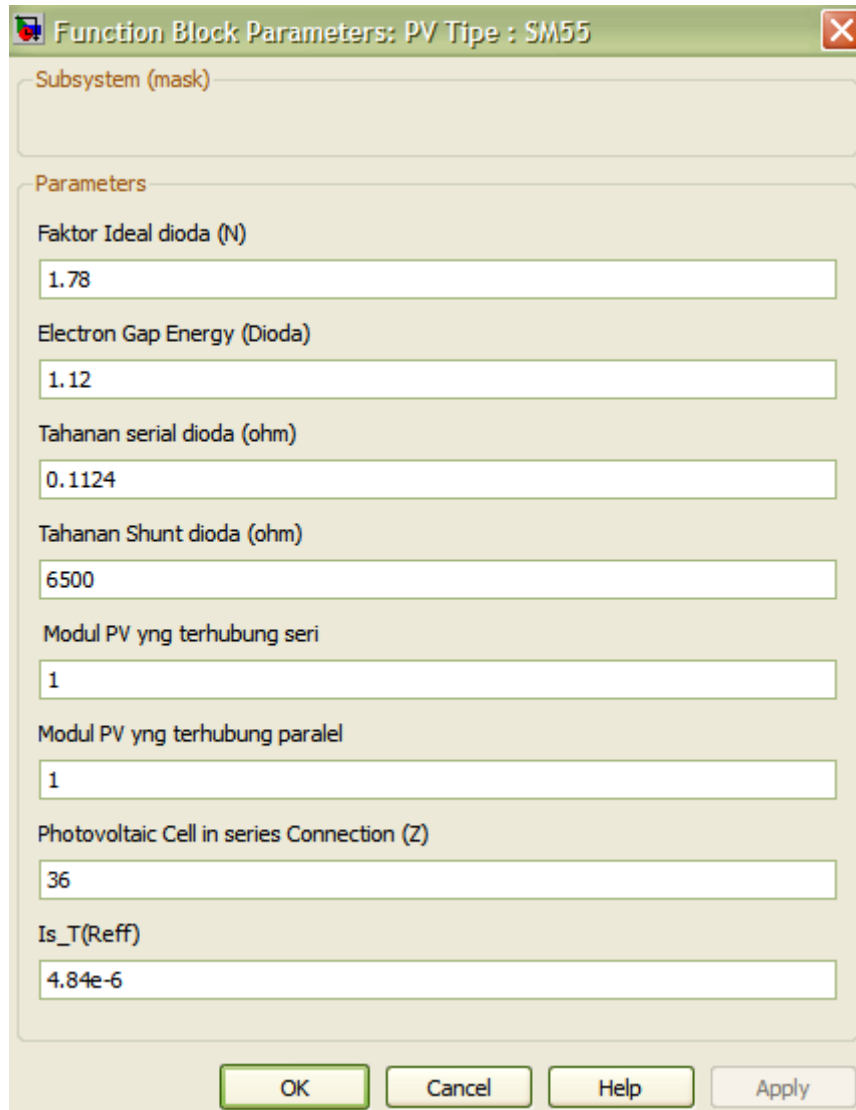


LAMPIRAN B

PARAMETER-PARAMETER PADA BLOK  
SIMULINK™ -MATLAB™

## B.1 Modul Panel Surya dan *Solar Array*.

```
%Deklarasi fungsi2 Modul Panel Surya dan Solar Array  
K=1.381*10^-23; % Konstanta Boltzmann (J/K)  
q=1.602*10^-19; % Electron charge (C)
```



Function Block Parameters: PV Tipe : SM55

Subsystem (mask)

Parameters

Faktor Ideal dioda (N)  
1.78

Electron Gap Energy (Dioda)  
1.12

Tahanan serial dioda (ohm)  
0.1124

Tahanan Shunt dioda (ohm)  
6500

Modul PV yng terhubung seri  
1

Modul PV yng terhubung paralel  
1

Photovoltaic Cell in series Connection (Z)  
36

Is\_T(Reff)  
4.84e-6

OK Cancel Help Apply

Function Block Parameters: Sel Surya By Tuanov

Subsystem (mask)

Parameters

Isc  
3.45

Voc  
21.7

Imp  
3.15

Vmp  
17.45

Koefisien Temperatur Isc  
0.0004

OK Cancel Help Apply

## B.2 Baterai 12V

Function Block Parameters: Simple batre4

Subsystem (mask)

Parameters

Tahanan Batre (Rb)  
0.016

Tegangan Open Circuit Batre (V1)  
12

OK Cancel Help Apply

### B.3 Konverter DC-DC *Buck-Boost*



The image shows a software window titled "Function Block Parameters: XXX". The window contains a "Subsystem (mask)" field which is empty. Below it is a "Parameters" section with several input fields:

- C**: 47e-6
- L**: 1.2e-3
- rL**: 0.05
- Rds\_ON**: 0.085
- Vd**: 0.7
- Switching Frequency**: 20e3
- Drain-Source leakage current (Idso)**: 100e-9
- Drain Voltage (Vdd)**: 12

Turn-on delay time (td)  
8e-9

Drain-source current (Ids)  
1.5024

Turn-on rise time (tr)  
105e-9

Saturated drain to source voltage (Vds\_sat)  
1.25

Storage time (ts)  
22e-9

tf  
39e-9

Off time (to)  
92e-9

OK Cancel Help Apply

#### B.4 Pengendali MPPT

Function Block Parameters: Algoritma Controller1

Subsystem (mask)

Parameters

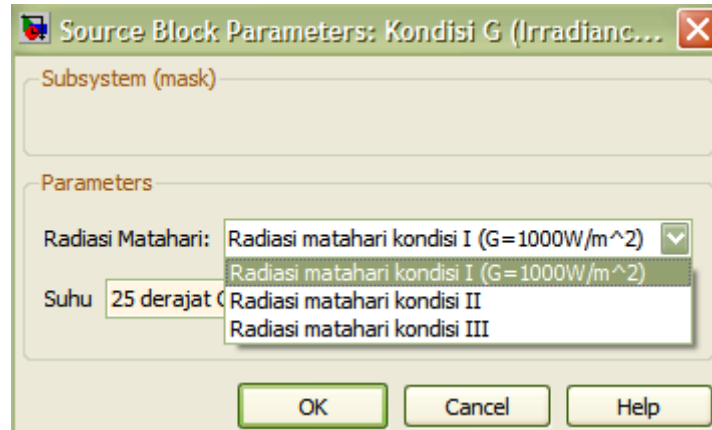
Pilih Algoritma Metode Tegangan konstan

delta Duty Cycle (dD)  
0.001

Open Circuit Voltage (Voc)  
21.7

OK Cancel Help Apply

## B.5 Radiasi Matahari dan Suhu Modul Surya





LAMPIRAN C  
DATA SHEET

C.1 Modul Panel Surya SM55

# AP-SM55

HIGH EFFICIENCY POLYCRYSTALLINE  
PHOTOVOLTAIC MODULE



FRONT

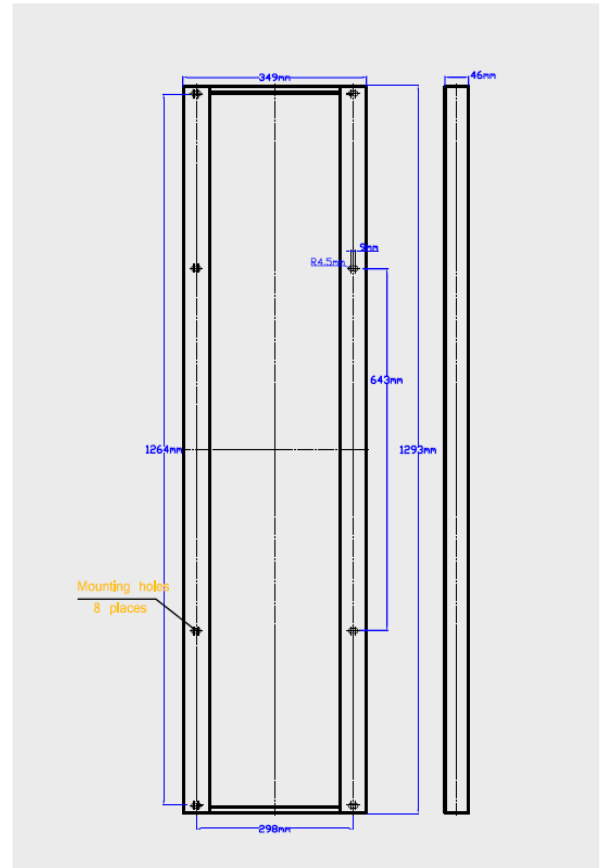
BACKGROUND

## MODULE DISCRPTION

The Alps AP-SM55 module features poly-crystalline photovoltaic cell technology. The 36 (6" x 3") square solar cells are encapsulated beneath high transmission tempered glass using an advanced, UV resistant thermal setting plastic. The encapsulant ethylene vinyl acetate (EVA) cushions the solar cells within the laminate and ensures the operating characteristics of the solar cells under virtually any climatic conditions. The rear surface of the module is completely sealed from moisture and mechanical damage by a continuous high strength polymer sheet. The glass/ tedlar construction of the module minimizes weight while providing a durable, protective environment for the solar cells. The Alps AP-SM55 is available as a complete module or a laminate.



J-box



## DATA SHEET

Electrival Data		
Maximum Power(Pmax)	[ W ]	55
Tolerance	[ % ]	+10/-10
Maximum Power Voltage	[ V ]	17.4
Maximum Power Current	[ A ]	3.16
Open Circuit Voltage (Voc)	[ V ]	21.7
Short Circuit Current (Isc)	[ A ]	3.4
Temp. coefficient of Voc	[ V/°C ]	-0.37x10 <sup>-2</sup>
Temp. coefficient of Isc	[ A/°C ]	0.08x10 <sup>-2</sup>
NOCT	[ °C ]	47
Max System Voltage	[ V ]	600

Dimension		
Length	[mm]	1293
Width	[mm]	349
Depth without box	[mm]	46
Weight	[kg]	7

Cells	
Number per module	36
Cell Technology	Polycrystalline
Cell Shape	Rectangular
Temperature Coefficient Power Pmax/°C	-0.44%

## C.2 Baterai 12V (BS131N)

### Product Data Sheet

# BS131N

Sealed Lead-Acid Battery - 12V 18Ah



### Standard Features

- Maintenance free
- Lead-Calcium grid for extended life
- Wide operating temperature range
- Usable and rechargeable in any position
- Low self-discharge and long service life
- Leakproof construction
- High discharge rate capacity

## Specifications

Power supply	12 VDC
Nominal capacity	18 Ah, 20 h rate
Max. charge voltage at +20°C	13.8 VDC
Max. charge current	5.4 A
Max. discharge current	90 A
Internal approx. resistance	10 mohm
Temperature	
Charge	0 to 40°C
Discharge	-15 to +50°C
Storage	-15 to +40°C
Terminal type	MS bolt & nuts
Material housing	ABS
Fire retardant	-
Weight	6.283 kg
Dimensions (W x H x D)	181 x 76 x 167 mm
VdS approval	G101081

## Ordering Information

Part No.	Description
BS131N	Sealed Lead-Acid Battery - 12V 18Ah - VdS approved
BS131NS3	Sealed Lead-Acid Battery - 12 V 18 Ah - V0 Flame Retardant Case

## C.3 MOSFET



### RFD3055LE, RFD3055LESM, RFP3055LE

Data Sheet

January 2002

#### 11A, 60V, 0.107 Ohm, Logic Level, N-Channel Power MOSFETs

These N-Channel enhancement-mode power MOSFETs are manufactured using the latest manufacturing process technology. This process, which uses feature sizes approaching those of LSI circuits, gives optimum utilization of silicon, resulting in outstanding performance. They were designed for use in applications such as switching regulators, switching converters, motor drivers and relay drivers. These transistors can be operated directly from integrated circuits.

Formerly developmental type TA49158.

#### Ordering Information

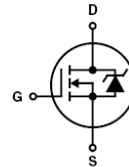
PART NUMBER	PACKAGE	BRAND
RFD3055LE	TO-251AA	F3055L
RFD3055LESM	TO-252AA	F3055L
RFP3055LE	TO-220AB	FP3055LE

NOTE: When ordering, use the entire part number. Add the suffix, 9A, to obtain the TO-252 variant in tape and reel, e.g. RFD3055LESM9A.

#### Features

- 11A, 60V
- $r_{DS(ON)} = 0.107\Omega$
- Temperature Compensating PSpice® Model
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- Related Literature
  - TB334 "Guidelines for Soldering Surface Mount Components to PC Boards"

#### Symbol



#### Packaging

