

EquinoxPV

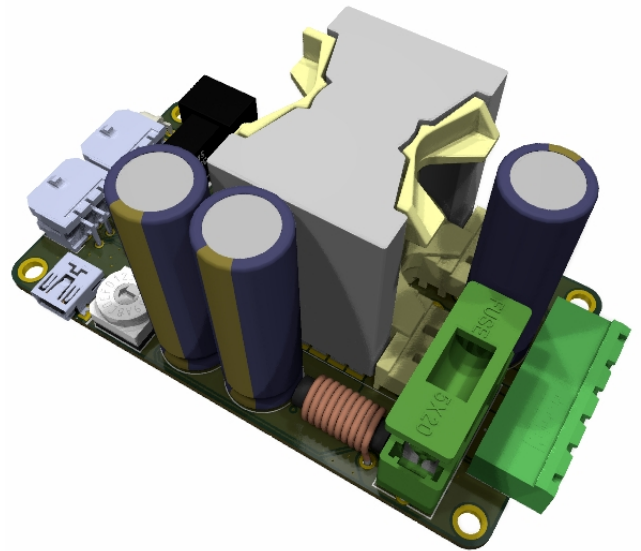
MPPT V1.0

Features

- Input current range: 0 to 7 A
- Output voltage range: 10 V to 180 V
- Boost converter topology
- Peak efficiency: 99.6%
- Ultra Fast MPP tracking response
- Small footprint: World's smallest MPPT for the given specification (5 x 9 cm)
- Compatible with all types of batteries
- High reliability and protection features
- Real-time telemetry data output
- Input / Output control via CAN Bus

Applications

- High efficiency solar systems
- Battery charging
- Electric vehicles (EV)
- Racing Solar Cars
- Portable solar chargers



General Description

This document provides the technical specifications of the EquinoxPV Maximum Power Point Tracker (MPPT) designed for solar energy systems. The MPPT operates with an input current range of 0-7 A and a wide output voltage range from 10 V to 180 V using a boost converter topology. It is optimized for high efficiency and reliable operation in photovoltaic systems.

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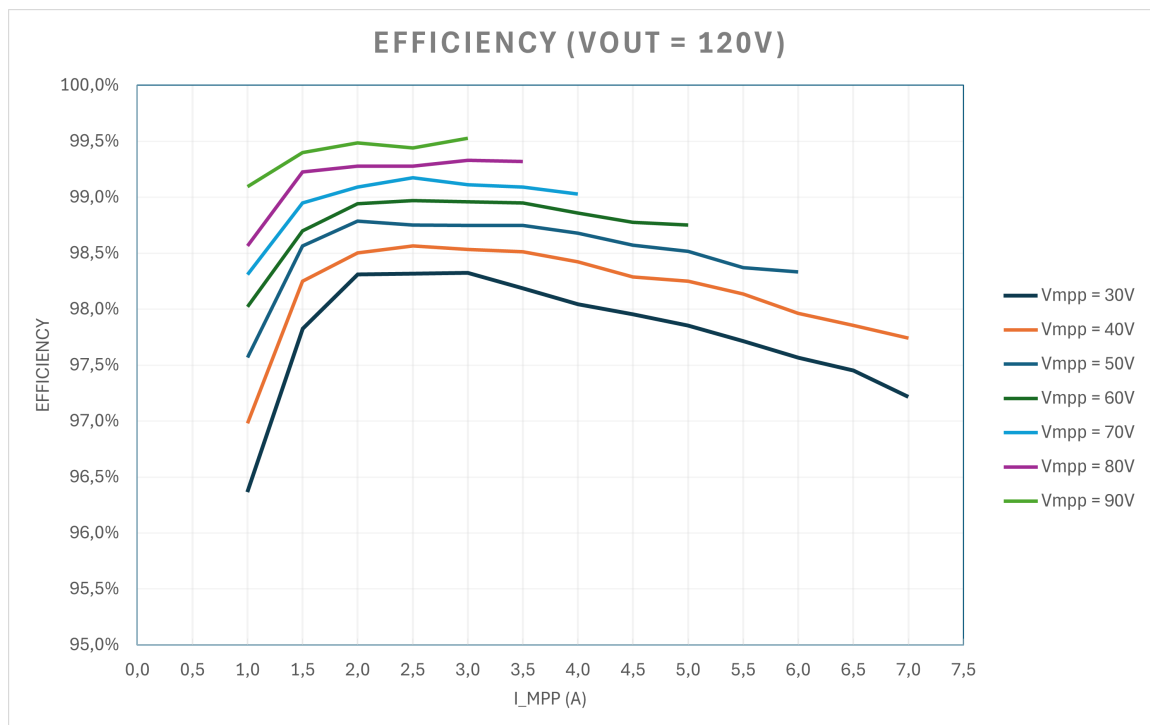
1 Specifications

Parameter	Symbol	Min.	Typ.	Max.	Units.
Input Voltage	V_{in}	0	-	175	V
Input Current	I_{in}	0	-	7	A
Output Voltage	V_{in}	10	125	180	V
Output Current	I_{in}	0	-	7	A
CAN Supply Voltage	V_{can}	10.8	12	13.2	V
CAN Speed*	V_{can}	125	-	1000	kbps

* The CAN speed can be configured with the EquinoxPV software.

NOTE: The input voltage should never exceed the output voltage to avoid leakage from the internal diode.

2 Performance Curves



3 Physical and Environmental Specifications

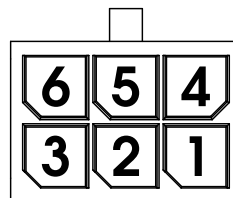
- Dimensions: 90 mm x 50 mm x 45 mm
- Weight: 185 grams
- Operating Temperature: -20°C to 60°C
- Storage Temperature: -40°C to 85°C
- Cooling: Passive cooling with optimized heat dissipation

4 Pinout

4.1 CAN Connector

Front view of the Micro-Fit 3.0 **female** connector head.
(P/N: 0430450600, Molex)

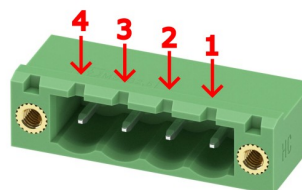
Pin #	Name	Description
1	V _{can}	CAN Supply Voltage (+12V)
2	GND	CAN Ground
3	SHIELD	CAN Shield
4	CAN_H	CAN High Signal
5	CAN_L	CAN Low Signal
6	SHIELD	CAN Shield



4.2 Power Connector

(P/N: 1924101, Phoenix Contact)

Pin #	Name	Description
1	Vout (-)	BATTERY Negative
2	Vout (+)	BATTERY Positive
3	Vin (+)	INPUT Positive
4	Vin (-)	INPUT Negative



- ⚠ ALWAYS DOUBLE CHECK POLARITY BEFORE CONNECTING
- ⚠ ALWAYS PRECHARGE OUTPUT

5 LED Status

The table below shows the corresponding MPPT status of the onboard LED:

LED State	MPPT Status
Solid Green	Normal Operation
Blinking Orange	Standby
Solid Orange	Limit Control Loop
Solid Red	Error

6 Messages and Signals (CAN Data)

This section describes the CAN messages transmitted and received by the MPPT for monitoring and control.

6.1 Base ID

The base ID of the MPPT is configured as follows: the first hexadecimal number is set in the MPPT software, while the second one is defined by the onboard rotary encoder.

The default Message ID is **0x6XY**, where '6' can be adjusted in the provided software, 'X' depends on the rotary encoder value and 'Y' corresponds to the message ID defined below.

6.2 CAN Broadcast Messages

Message ID	Bytes	Variable Type	Signal description	Units
Base ID + 1	Byte 0-3	FLOAT	Input Voltage	Volt
	Byte 4-7	FLOAT	Input Current	Ampere
Base ID + 2	Byte 0-3	FLOAT	Output Voltage	Volt
	Byte 4-7	FLOAT	Output Current	Ampere
Base ID + 3	Byte 0-3	FLOAT	12V Rail Voltage	N/A
	Byte 4-7	FLOAT	3.3V Rail Voltage	N/A
Base ID + 4	Byte 0-3	FLOAT	Power Transistors Temperature	°C
	Byte 4-7	FLOAT	Ambient Temperature	°C
Base ID + 5	Byte 0	UINT8	Limit Flags	N/A
	Byte 1	UINT8	Error Flags	N/A
	Byte 2-7	-	RESERVED	N/A
Base ID + 6	Byte 0-7	-	RESERVED	N/A
Base ID + 7	Byte 0-7	-	RESERVED	N/A

6.2.1 Limit Flags

The 'limit flags' byte provides information about the operating constraints of the MPPT. Each bit in the byte represents a specific limit condition:

Bit Position	Description
0	Input Current Limit
1	Input Voltage Limit
2	Output Voltage Limit
3	Temperature Derating
4-7	RESERVED

6.2.2 Error Flags

The 'error flags' byte indicates error conditions within the MPPT. An error will automatically put the MPPT in Standby Mode until the device is rebooted. Each bit corresponds to a specific error:

Bit Position	Description
0	Output Overvoltage
1	Input Overvoltage
2	Negative Input Current
4	Power Transistor Overheating
5	Rail Undervoltage
6-7	RESERVED

6.3 CAN Control Messages

Message ID	Bytes	Variable Type	Signal description	Units
Base ID + 8	Byte 0	UINT8	Control Mode	N/A
	Byte 1-7	-	RESERVED	N/A
Base ID + 9	Byte 0-3	UINT32	Global Sweep Intervals	ms
	Byte 4-7	-	RESERVED	N/A
Base ID + A	Byte 0-3	FLOAT	Input Current Limit	N/A
	Byte 4-7	FLOAT	Output Voltage Limit	N/A
Base ID + B	Byte 0-7	-	RESERVED	N/A
Base ID + C	Byte 0-7	-	RESERVED	N/A

6.3.1 Control Modes

The 'Control Mode' byte indicates the operating mode of the MPPT.

Bit Position	Description
0	Standby
1	Local Sweep (Default)
2	Single global sweep, then returns to mode 1
3	Regular global sweeps at specified intervals
4	Perform slow global sweep in 5 seconds to retrieve I-V curve
5-7	RESERVED

7 Protection Features

- Overvoltage protection
- Overcurrent protection
- Temperature derating and thermal shutdown
- Short circuit protection (+ on board 15 amp 5x20mm fuse)

8 Ordering Information

Part Number	Description	Package
EPV-BO-007A-180V	MPPT 0-7 A, 10-180 V Output	Cardboard Box

9 Contact Information

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