EB397 Ideal Diode Specification

Document Number

DS397 Rev 1.0

Description

24V, 12A Ideal Diode

Inspired Energy Part Number

EB397

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Specification Number	DS397A
Specification Revision	1.0
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1. REVISION HISTORY

Revision	Release Date	Revisions	Issued By	Approved By
0.1	3/11/16	First draft	WRL	
1.0	4/18/16	Release	WRL	RAH

2. INTRODUCTION

2.1. Scope

This specification describes the physical, functional and electrical characteristics of an Ideal Diode intended to allow paralleling batteries. This specification is the interface document between Inspired Energy and its customer. It is understood that the customer may create their own internal specification. However, this specification is the master that defines the device's operation. The circuit produced will meet this specification.

2.2. Overview

This specification describes the physical, functional and electrical requirements for the EB397 Ideal Diode assembly. The board allows connection points to the SCL, SDA and THM pins of the battery. However, these are not otherwise connected to the Ideal Diode.

2.3. General Precautions

2.3.1. Handling

- Avoid shorting.
- Do not immerse in water.
- Do not disassemble or deform.
- Avoid excessive physical shock or vibration.
- Never cover or obstruct the airflow, as this will cause overheating.

2.3.2. Charge & Discharge

- Never use a modified or damaged Ideal Diode, battery or charger.
- Specified product use only.
- Caution – during use the Ideal Diode may become warm.

2.3.3. Storage

- Store in a cool, dry and well-ventilated area.

3. REQUIREMENTS

3.1. General Requirements

3.1.1. Input Power

The input power should be between 5 and 26VDC. The overvoltage clamp will turn on above 30VDC. The unit is designed to handle up to 12ADC. Reverse voltage should not exceed 26VDC. Be aware of high voltage transients when switching high currents.

3.1.2. Operation

Operational Temperature Limits: 0°C to +50°C, ≤ 80%RH

3.1.3. Storage

Storage Temperature Limits: -20°C to +80°C, ≤ 80%RH

The Ideal Diode should be stored in an environment with low humidity, free from corrosive gas.

3.1.4. Terminal Specifications

J1-J6 pin assignments (refer to the mechanical drawing for additional details).

Terminal	Legend	Description
J1	(+BAT)	4-24V Positive Battery input
J2	(C)	SMB serial clock
J3	(D)	SMB serial data
J4	(T)	Battery ID (often 300 or 10K ohms to ground)
J5	(GND)	Battery Negative input.

J6 (refer to the mechanical drawing for additional details).

J6-1	(+)	DC Positive to battery.
J6-2	(C)	SMBus Clock.
J6-3	(D)	SMBus Data.
J6-4	(T)	Battery ID (often 300 or 10K ohms to ground)
J6-6	(-)	Battery Negative input.

3.2. Ideal Diode Electronics

3.2.1. DC Specifications

Parameter	Limits	Remarks
Active current consumption	<30uA	5-24VDC input power is applied.
Reverse polarity leakage	<10uA	5-24VDC reverse polarity
Max rated forward current	12A	5-24VDC
Max rated forward voltage drop	60mV	At 12A forward current

3.2.2. Forward Voltage Drop

The forward voltage drop consists of three components:

1. The resistance to the copper connections, about 1 milliohm
2. A voltage drop required to sense the current direction, 10-32mV, typically 20mV
3. The resistance of the control transistor, 2-4milliohms, 3 milliohms typical

Typically, the forward drop is less than 25 milliohms up to 6A. Above 6A the voltage drop is approximately the current times 4 milliohms, not to exceed 60mV at 12A. Note at 12A this small board could be dissipating up to .75W, and mounting, wire gauge and air flow will affect performance.

3.2.3. Reverse Current

The Ideal Diode will be powered from the highest voltage present, 30uA max. The current passing through the diode in the reverse direction is primarily the leakage current of the control transistor, less than 10uA.

3.2.3.1. Overvoltage Protection

Typically, several batteries will be connected in parallel, which can deliver very high current. When this current is interrupted, the inductance of connecting cables can cause high voltage ringing, which will be applied to all connected Ideal Diodes. 31V overvoltage clamping and snubbers are provided, however, the transients are application dependent, and must be considered in overall system design.

3.2.3.2. Multi-Board Wiring

Each Ideal Diode board is individually capable of passing up to 12A. For convenience in wiring several units in parallel, there are two connections for each the battery terminals, so that several boards may be "daisy-chained". However, batteries connected in parallel can deliver very high current. The wires and board closest to the load will be subject to the sum of the battery currents. The PCB copper and wiring is not rated for more than 20A. If the total load current will be higher than this, each Ideal Diode should be connected individually to common connection points at the load.

If several batteries are connected in parallel with intent to get more current than one battery is capable of, it is important that the batteries all be at the same voltage (state of charge). If the battery voltages differ by more than about 50mV, the highest voltage battery will attempt to supply the load by itself, then shut off on overcurrent, shifting the load to the next highest voltage battery, which may also shut off. This ripple effect can cause all batteries to shut off one by one, rather than share the required load current. Once the load is on, the batteries will automatically distribute the current to equalize the load current.

3.3. Mechanical Specifications

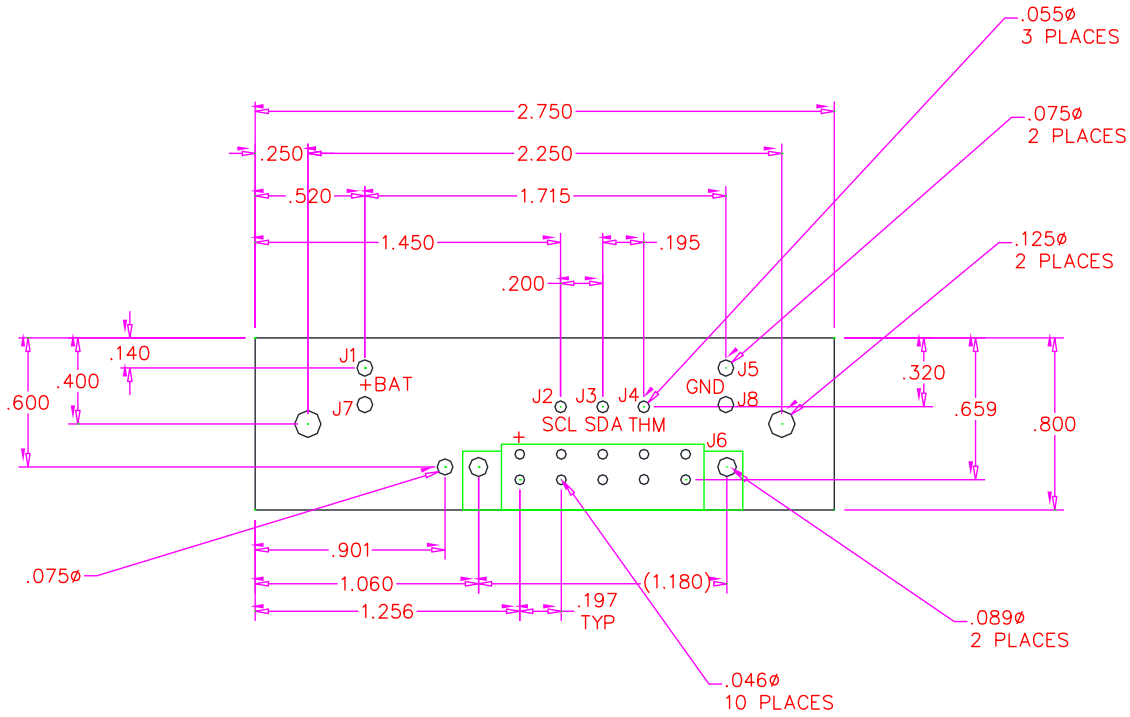
3.3.1. Weight

Approximately 1 ounce (30 gm).

3.3.2. Mating Connectors

The Ideal Diode board is furnished with no installed connectors. The board is intended for use with any of:
1. IE 610005, TE 5787466-1 5-blade header, perpendicular, no key
2. IE 610007, TE 5787422-1 5-blade header, right-angle, keyed right (for bottom side mount)
3. IE 610018, TE 5787428-1, 5-blade header, right-angle, keyed left (for top side mount)

3.3.3. Mechanical Drawing



3.4. Environmental/Safety Specifications

3.4.1. Warranty

A high quality standard is maintained by Inspired Energy. All products are warranted against defects in workmanship, material and construction. The warranty period is one (1) year from the date of shipment from Inspired Energy.